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PRACTICE OF SURGERY.

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Sacramento,
Cal.

THE PRACTICE OF SURGERY.

BY

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Owing to the absence of Dr. Sargent in Europe, this reprint of Professor Miller's last edition of his "Practice of Surgery," has been carried through the press by a professional gentleman of this city, who, while referring to such of Dr. Sargent's notes as were deemed important, and had not been embodied in the text by the author, has also added some additional matter, relating chiefly to the progress of Surgery in this country. Many additional woodcuts have also been introduced; and the Publishers trust that these additions, which are distinguished from the text by brackets [ ], will enhance the usefulness of a work which has become established as one of the favorite Text-Books throughout this country.

Philadelphia, June, 1857.

38096

PREFACE TO THE THIRD EDITION.

THE following Pages, though designated by the special Title of "Practice," really constitute the Second Volume of a Continuous Exposition of Principles and Practice, together forming a complete System of Surgery.

The Author, while again thanking the Profession in this country for their favorable reception of the work, takes leave to express his grateful acknowledgment to Dr. Sargent, of Philadelphia, for the kind and able manner in which he has edited the American Republications.

EDINBURGH, 1855.

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THE PRACTICE OF SURGERY.

CHAPTER I.

OPERATIONS.

It is a favorite phrase by which operations are stigmatized as the "opprobria of surgery." Nothing can be more unjust. Safely and expeditiously to remove parts which accident has rendered totally useless, and which would prove highly injurious if longer attached to the body; to take away diseased formations, or other noxious substances, and, at the expense of suffering, comparatively brief and slight, to dispel torture which had rendered existence a burden for previous weeks, months, and years; to accomplish such results, is alike creditable to the operator and beneficial to the patient. It is not the operation—but the operation unseasonably, unnecessarily, unskilfully performed—that brings disgrace; and to refrain from operating when we are plainly and peremptorily called upon to do so, would involve not only opprobrium to surgery, but guilt and shame to the surgeon. In former times, it is true, operations were the disgrace of our art. Knives, hot irons, screws, files, gimlets, gouges, hammers, and saws, were employed with cruel and ignorant recklessness. Of late years, however, every good surgeon has sought not only to simplify and diminish the number of instruments, but also to use them as seldom as possible. He does not hesitate to employ them, when his knowledge and experience intimate that they have become indispensable; on the contrary, he will then probably be urgent in their application, knowing that an early wound may save much after-suffering. But, in the first place, he will exert all his skill and all his powers, by milder measures, so to counteract injury and restrain disease, as to supersede the necessity for operating. To effect this, is doubtless the true triumph of his profession; and to this triumph he often attains. But he must be Utopian indeed who can seriously hope that the period will ever arrive, when operations shall have altogether ceased to be required. Modern surgery, accordingly, while anxious to limit the necessities for operation, is not the less aware of its importance as a means of cure; and has not only directed attention towards its improvement, but also extended its application, and with the happiest result, to diseases formerly without remedy. Many patients, for example, are now by the knife freed from morbid growths and natural deficiencies, who were formerly left a hopeless prey to deformity and disease.

A prominent cause of modern improvement in the art of operating, is an increased simplicity of the instruments, their arrangement, and use. On this subject, one who was pre-eminently distinguished among the operators of the present day, observes:[1] "Our armamentaria should contain simple and efficient instruments only; the springs, grooves, notches, and curves, seeming to be chiefly intended to compensate for want of tact and manual dexterity. The apparatus, though simple, ought to be in good order, and should always be placed within easy and convenient reach of the operator, so that he may be in a great measure independent of the lookers-on; who, owing to anxiety or curiosity, hurry and agitation, are apt to hand anything but what may at the instant be required. He will consider well what place he himself may most conveniently occupy during the operation; and, having obtained proper assistants, he will make sure that they all understand what is expected of them. In short, before he ventures to begin, he will ascertain that everything is arranged, and in proper order; more particularly, that the cutting instruments have good points, that their edges are keen, and that the joints of forceps and scissors move freely and readily. The principle, too, on which the instrument is made to cut should be well considered. Every knife is to be looked upon as a fine saw; the teeth of some are set forwards, and these cut best from point to heel, as does a razor; but the greater number are set in the opposite direction—for example, the common scalpel and bistoury—and act efficiently only in being drawn from heel to point.

"The skin, and in many instances the subjacent parts, should be divided at once and completely, by a single incision made lightly and rapidly—the parts being placed in a state of tension by the fingers of the surgeon or of an assistant—for the pain experienced is in proportion to the pressure and tardiness of movement in the instrument applied. Partial division of the skin, in tails left at each end of an incision, is also to be avoided; for the pain of such a cut is unnecessarily severe; and, besides, such wounds are not so available, as they would otherwise be, for the intended purpose of evacuating fluid, for permitting the extraction of foreign bodies, or for the dissection of morbid growths. Also, the pausing of a surgeon in the midst of a dissection, and the resort to fresh and more extensive incisions of the surface, is not only always awkward, but attended with additional and unnecessary pain to the patient. Every cutting instrument should be well balanced and placed in a steady, smooth handle; the point should either be in a line with the back, which ought then to be perfectly straight, or both edge and back should be equally convex, with the point corresponding to the middle of the blade.

"The form and size of the instrument ought always to be in proportion to the extent of the proposed incisions, as regards both their length and their depth: nothing can be imagined more cruel and reprehensible, for example, than an attempt to remove the lower extremity of a full-grown person with a common scalpel or dissecting knife. If an extensive incision is necessary, an instrument should be employed possessing length of edge sufficient to separate the parts smoothly and quickly. Should the operator, on the contrary, be required to cut on important parts—to perform a delicate dissection of the living tissues—he will choose a short-bladed instrument, with a handle rather long and well rounded; and, after the superficial incisions have been effected, he will hold it as he would a writing-pen, lightly but firmly, so that he can turn the edge, and cut either towards or from himself, as occasion may require. A small well-made scalpel, with a good point, and less convexity than those usually employed, is the instrument best adapted for such a purpose. Grooved probes and directors should be used as little as possible. With a little practice, incisions may be made upon the most delicate parts without risk, one layer being cut after the other. And if any instrument is wanted to make the proceeding more safe—if the closely investing fasciæ of a hernial tumor, for example, are to be cautiously raised—dissecting forceps will be found the most convenient instrument for elevation previous to incision.

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[1] Liston, Operative Surgery.

"In dividing the skin, the knife, whether a scalpel or a bistoury, is to be held and entered with the point and blade at right angles to the surface. It is carried with a decided movement down to the subcutaneous cellular tissue; the blade is then inclined towards the part to be divided, and by a rapid and slightly sawing motion—as little pressure being applied as possible—division is effected to the desired extent. The incision is finished by withdrawing the knife in a position perpendicular to the surface, so as to divide the entire thickness of the skin, at the extremity as well as at the origin of the wound. For dexterously effecting such manipulations, the fingers must be educated; and diligent practice in the dissecting-room will be found the best foundation for surgical dexterity, as it is for sound surgical knowledge; it is only when we have acquired dexterity on the dead subject that we can be justified in interfering with the living." By practice, the pupil will be enabled to use either hand almost equally well; and none should neglect to attain this power—for an ambidextrous surgeon possesses great advantages as an operator.

While an ordinary degree of expertness is within the reach of any one, who will industriously seek for and improve the opportunities for its acquirement, yet a certain combination of natural qualifications is undoubtedly necessary to the attainment of pre-eminence in operative surgery; a great operator in one respect resembling a great poet,—"nascitur, non fit." The importance of these natural gifts did not escape Celsus. "He must be young, or at most but middle-aged," says he, "and have a strong steady hand, never subject to tremble. He must be ambidextrous, and of a quick, clear sight. He must be bold, and so far void of pity that he may have in view only the cure of him whom he has taken in hand, and not, in compassion to cries, either make more haste than the case requires, or cut less than is necessary, but do all as if he were not moved by the shrieks of his patient." The coolness and courage thus inculcated are among the most valuable natural gifts of the surgeon; and it would be well, too, did every patient remember that they are equally important in himself, for on *his* steadiness and patience under suffering much of the celerity and success of an operation may sometimes depend.

In the present day, however, the operator is much less dependent on his patient than he was wont to be; in the great majority of cases the latter being absolutely passive in his hands, because quietly recumbent under the influence of complete anæsthesia. The obtaining of such quietude and non-resistance, the abolition of pain, the mitigation of shock, and various other advantages affecting both operator and patient, from the judicious use of chloroform, have been already fully considered,[1] and on that subject it is not necessary again to enlarge.

The necessity for an operation, in any case, having been clearly established, our object is to perform it as safely and expeditiously as possible. The mere absence of protracted pain confers a most important advantage on the reparative powers of the system; and, so far, celerity is commendable, when chloroform is not employed. But it is a very common as well as dangerous error, to suppose that excellence is always commensurate with the rapidity of performance. In the great majority of cases, haste is incompatible with safety; while the latter is the paramount object in view. "Tuto et celeriter" is the operator's motto; but the "tuto" precedes its accompaniment. And now, more than ever, haste and hurry are altogether inexcusable. The student, as an operator, should learn to be rapid; but rapid, because skilful; and rapid only when safe. And, in some procedures, he will not fail to learn that attempted rapidity must ever prove injurious.

Perhaps a more common, and still more serious error is—the imagining that operations constitute the greater and more important part of Practical Surgery. The student is very apt to be led away by the more garish and imposing parts of his profession, to the neglect of that which is in truth by much the more valuable; and he may also forget that, in after-life, he will be only occasionally called upon to perform the greater operations, while daily he must exert his general knowledge and skill, as well as his minor handicraft, to avert the necessity for the knife's employment. In the case of a diseased joint, for example, he is not at once to contemplate amputation or resection. Such procedure is the ultimatum, not the initiative of his art. Local depletion, rest, counter-irritation duly timed and conducted, pressure, splints, attention to the general health (*Principles*, 4th Am. Ed. p. 451), these—to some apparently a simpler, but in truth a far higher adaptation of knowledge—conspire, and often with success, not to mutilate the frame and endanger life, but to save both life and limb, at little or no cost of either pain or danger. Again, in the torturing complaint of stone in the bladder, it is doubtless a great matter to be able, by a speedy operation—severe, and perilous to life though it be—to free the patient from his misery. And the accomplished surgeon must be at all times competent to undertake fearlessly this hazardous work. But it is surely a higher exercise of a better skill, and both the means and the result will prove infinitely more creditable and satisfactory, if, by the internal use of simple remedies, and suitable attention to hygiene, the disease shall be in its very origin frustrated, pain and danger dispelled, and health and comfort restored—all without the infliction of a scratch, or the loss of one drop of blood. In the case of injury, too, the paramount importance of general treatment will be found equally to obtain. The surgeon is ready at a moment's warning, to amputate skilfully a crushed limb, which has obviously no chance of retaining its vitality, and which, if not speedily removed, must inevitably peril the whole frame's existence; and when, by such severe operation, he succeeds in averting the greater calamity, he has most just ground for self-gratulation, and may truly say that a good thing has been done by his art for suffering humanity. But when, in the case of an injury a shade less severe, there is a doubt whether or not the limb may be enabled to resist the threatened gangrene; when he hesitates not to give to his patient the benefit of that doubt; when, by great patience, care, and skill, he arranges the mangled fragments in their proper place, retains them so by suitable apparatus, affording due support, and yet permitting no undue pressure, regulating the play of the general circulation, controlling the efforts of the *vis vitæ*—in short, averting both local and general disaster, and bringing the healthful work of repair to complete, though it may be slowly, its valued process of cure; and when ultimately a thorough and permanent success crowns such patient and anxious labors—surely the cause for self-gratulation is increased a hundred fold; the surgeon may well say that a far better thing has been done by his art; and the discerning public will not fail to award a higher and truer meed of praise.

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[1] Principles of Surgery, 4th Am. Ed. p. 658.

The advance of surgery will ever be found characterized by a corresponding decrease of its operations, both in amount and in severity. The true object of our mission is not to cut, but to cure.

See on this subject, John Bell's large Treatise on Surgery; and the various modern works on Operative Surgery, more especially those of Liston, Fergusson, and Skey.

CHAPTER II.

INJURIES OF THE SCALP.

Bruise of the Scalp.

THE scalp is especially liable to severity of contusion. It is a part much exposed to external injury; it is stretched over dense resisting bone; it is possessed of very considerable vascularity; and its arterial branches, being neither inactive nor minute, are apt to part with blood freely when torn. Hence, when external violence is applied, the higher results of contusion are very apt to follow (*Principles*, 4th Am. Ed. p. 651). The integument may give way; causing a contused wound, of greater or less extent, whose margins will slough and separate, and which will not heal without considerable suppuration, and a corresponding amount of attendant inflammation. Or the skin, at first unbroken, may slough to a greater or less extent; either immediately, from the direct effect of violent contusion; or secondarily, by inflammation induced in a part whose vitality had been only lowered by the bruise, not annihilated. Or, the integuments remaining entire, blood is copiously extravasated from ruptured vessels; breaking up the areolar tissue, and producing a large fluctuating tumor—sometimes forming rapidly, with tension of the skin, and much pain in the part. Or, subsequently to sanguineous infiltration, inflammation may be lighted up in the implicated texture; inducing suppuration of an unfavorable kind, with a considerable amount of constitutional disturbance, and with a risk of the latter being unfavorably affected by the suppuration assuming the asthenic, diffuse, and infiltrating character (*Principles*, 4th Am. Ed. p. 201). The danger of such occurrences must be remembered in the prognosis.

But the ordinary result of bruise, in this locality, is the formation of a bloody tumor; blood escaping more or less freely from torn vessels, and accumulating in the part; while room is made for its reception, partly by disruption of texture, partly by that which remains entire being pushed aside and condensed. As already stated, the integument is tense or not, according to the rapidity and amount of extravasation. At first, the indications by touch are uniform throughout the whole swelling, all the blood being as yet fluid; and uniform fluctuation is more or less distinct, with elasticity. Soon, however, the blood in part assumes the solid form; and then the characters of the tumor change. At the circumference, there is a hard, resisting ring, more or less elevated, composed of coagulum. In the centre, the part is soft, yielding, fluctuating; the extravasation there remaining fluid, consisting chiefly of serum, and situated immediately beneath the integument. The clot occupies the margins.

At this period, care is required in examination, lest a false diagnosis be arrived at. The finger, placed firmly on the centre, readily displaces the serous fluid, and may seem to penetrate to some depth; while similar pressure, made at the margins, meets with hard, unyielding resistance—and that at a considerably higher level than had just been passed by the finger in pursuit of the retreating serum. The careless observer of such things is apt to imagine them undoubted indications of fracture, with depression, having occurred in the cranium; supposing the hard ring to be the bone in its normal position, with an abrupt broken margin, beneath which a detached portion has been driven down. Attention to three or four circumstances, however, will suffice to undeceive. The symptoms of depressed cranium do not exist. Press firmly on the soft and yielding centre; the subjacent bone will be reached, by displacement of the intervening fluid blood, and will be felt firm. The hard rim of the swelling will be found on a higher level than the general calvarium; and, besides, by a little firmness of manipulation, if such be deemed necessary, the clot can be displaced somewhat, leaving firm bone beneath.

The treatment of such a bruise is conducted on the principles generally applicable to this description of injury (*Principles*, 4th Am. Ed. p. 652). In certain situations—as directly over known branches of the temporal or occipital arteries—swelling may be in a great measure prevented, by moderate pressure being steadily maintained on the cardiac aspect of the implicated vessel; and this indication may be further fulfilled, by continuous application of cold to the part, and its immediate vicinity. When the tumor has formed, even tension will not warrant either puncture or incision; for the admission of atmospheric influence to the extravasated blood, and infiltrated tissue, is likely to induce inflammation under very unfavorable circumstances. By fomentation rather—associated, if need be, with restraining pressure on the arterial branch—let accommodation be obtained for the escaped fluid by a yielding of the recipient texture; ward off inflammation by general antiphlogistics; and await the disappearance of swelling, gradual and tedious though this be, by the natural process of absorption. The fluid portion of the extravasation is taken up first; the coagulum follows, more tardily.

But if inflammation shall have occurred, and suppuration formed, free and direct incision must not be withheld. By no other means can diffuse suppuration be prevented, and constitutional disorder checked. At once lay the part freely open; turn out the coagulum, and permit all fluids to escape. An unhealthy abscess remains for a time, but duly changes, contracts, and heals; and the knife is not again required. But, delay incision; and then the knife is called for, not merely in the bruised part, but in the parts adjacent, now the seat of a spreading asthenic inflammation, and in imminent danger of perishing thereby. The asthenic tendency, as formerly hinted, is probably owing to the bruise having lowered the vitality of the parts; so impairing their tolerance of the inflammatory process.

Constitutional management is not to be neglected. It is obviously of great importance to avert, or at least to moderate, the accession of an inflammatory process in the injured part. On this ground alone, rest and quietude, antiphlogistic regimen, and perhaps depletion, are expedient.

But the necessity for recourse to such precautions becomes still more apparent, when it is remembered that the brain, in all cases of severe bruise of the scalp, must have suffered more or less by concussion, and has to be protected from the consequences.

When all risk of inflammatory accession has passed, and swelling has not yet disappeared, absorption may be hastened by discutient measures. The part may be kept wet with a solution of the muriate of ammonia, or with a weak dilution in water of the tincture of arnica; afterwards friction may be used, and, if need be, pressure.

Bloody tumors, of the foregoing nature, not unfrequently form on the presenting parts of the heads of children, newly born; especially if the labor have been tedious, or the pains very violent.[1]

Wounds of the Scalp.

Simple incised wounds of the scalp are apt to prove troublesome by bleeding. The arterial point or points are to be exposed, and secured by ligature. Pressure may, in some instances, succeed; but, in general,

Fig. 1.

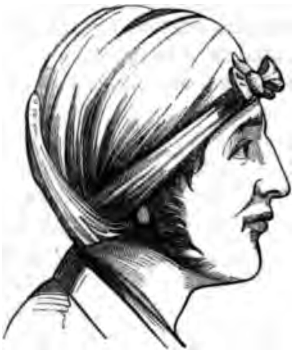

Fig. 1. The Couvre-chef; a handkerchief so arranged as to cover the head, with a view to retain dressing. The handkerchief having been folded into a triangular shape, the centre of the base is placed on the centre of the forehead, the body of the handkerchief covering the head, and the apex or corner hanging down the neck. The two long ends, previously lying on the cheeks, are crossed beneath the occiput, covering "the apex or corner," and are brought forward and tied on the forehead. The handkerchief is then smoothed by pulling the "apex or corner," which is turned over the crossed "ends," and secured.—*After Lonsdale. Lancet*, No. 1417, p. 470.

Fig. 2.

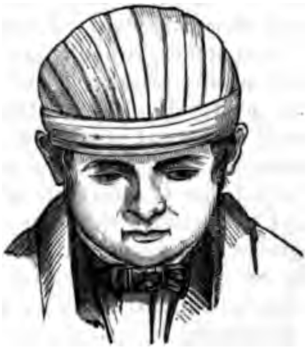

Fig. 2. A double-headed roller, applied so as to cover the head; making equable pressure on every point. The centre of the roller is placed low down on the forehead, and the two heads are carried back and made to cross low down beneath the occiput. One head is then brought over the vertex, while the other is carried horizontally round to lap its extremity; and this, turned up over the horizontal one, is carried back to the occiput, slightly overlapping the former vertical band. At the occiput, the heads are again crossed (the surgeon shifting hands), and a third turn is made on the other side of the vertical band, while a third horizontal round secures it as before. And this is continued until the whole head has been uniformly invested.—*After Lonsdale.*

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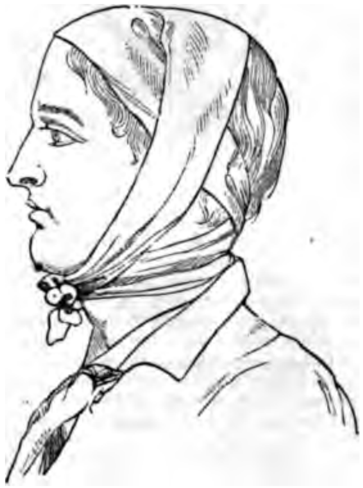
[1] This affection is designated by obstetricians *Cephalhæmatoma;* while simple bloody infiltration of the presenting part of the scalp is termed the *caput succedaneum.* In the commonest form of Cephalhæmatoma, the subpericranial, the tumor becomes surrounded at the base by an osseous ring, and the pericranium, too, is sometimes the seat of osseous deposit, so as to be felt crackling over the contained blood. This blood disappearing, the ossified pericranium approaches the bone, and unites with its rough and bare surface, causing slight thickening of the bone of that part.

it is decidedly inferior to the use of ligature; being not only less certain as a hemostatic, but also liable to induce sloughing, or at least a troublesome ulceration in the compressed part. When necessary, therefore, the surgeon need not hesitate to extend the wound, to facilitate accurate deligation. When bleeding has been arrested, the wound is to be brought together, and retained in apposition; but sutures are, if possible, to be avoided; experience having shown that here they are especially liable to prove the exciting cause of erysipelas. The subsequent management is such as is ordinarily adopted for securing adhesion (*Principles*, 4th Am. Ed. p. 555). One simple precaution should never be omitted at the commencement of the treatment; namely, the shaving of the scalp, not only at the wounded part, but to some distance around. The retentive straps, and other dressings, are then more readily and securely applied; the part is more certainly kept free from irritation; coolness is more easily maintained; and inspection of the wound's progress is more complete.

In contused and lacerated wounds, there is the same risk of unfavorable inflammation as in bruise; and this is, accordingly, to be guarded against. Very often, the wound is extensive, and irregular in form; a portion of the scalp is detached from the subjacent bone, and hangs over, an unseemly flap. Formerly, it was the custom to cut away the pendulous portion; it being considered incapable of reattachment. Now, it is invariably preserved, and carefully replaced. It seldom sloughs, even in part. Equally seldom, however, will it unite at once by adhesion. It suppurates, granulates, and becomes slowly, yet firmly and satisfactorily, rejoined to the subjacent parts. When a congested and flabby state of the flap occurs, as often happens, during the suppuration, support by carefully applied bandaging is highly expedient.

Fig. 3.



The four-tailed bandage; of use in retaining dressings on any particular part of the head. A piece of cloth split at either end: the central unsplit portion placed on the dressing. The two posterior ends secured below the chin; the two anterior ends, overlapping these, cross at the occiput, and are also secured below the chin.

For retaining dressings, and affording gentle support to the scalp, a common handkerchief may be applied, as in Fig. 1.

But when direct, accurate, and considerable pressure is required, the double-headed roller is preferable, as in Fig. 2.

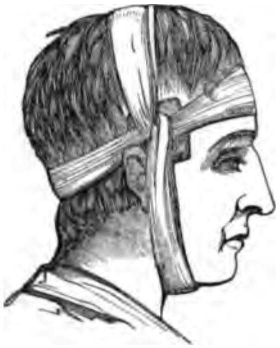
For retaining dressings on any particular part of the head, the four-tailed bandage is often very useful, as in Fig. 3.

Not unfrequently, the bone is rudely denuded of all its soft investments; as in heavy falls, when the head comes violently in contact with stone. The pericranium is rubbed off, and the bone is not only wholly exposed, but roughened in its own texture. In such cases, we are not to refrain from readjusting the soft parts, in the belief that exfoliation must necessarily ensue, and that an open condition of the wound is consequently to be desired. Many bones thus circumstanced recover entirely. They may, for a day or two, become white and dry on their mere surface, as if undergoing necrosis there; yet it is by no means unusual—when such necrosis is not favored by the treatment employed—to find this dry bone revive, becoming vascular, brown, and exhalent, as before, and in due time contributing its quota to the general process of reparation. Should inflammation supervene, and advance to suppuration, either in the limited or in the diffuse form, early incision is demanded; in the one case, to evacuate pus, and prevent accumulation; in the other, to limit its formation and prevent infiltration. When the areolar tissue beneath the occipito-frontalis expansion is implicated in the latter event, incision is required to be especially early and free; not only to avert destruction to texture, but also to prevent, or moderate, implication of the all-important cranial contents. These, indeed, must be duly regarded, throughout the whole period of treatment, as in simple contusion.

Punctured wounds of the scalp, usually oblique and penetrating, are always important; being very apt to be followed by severe inflammation; and at an early period, and on this account, demanding incision. As a general rule, it may be stated that the inflammatory process in the scalp must always be treated with great activity. First, because the textures are unfavorable for safe advancement of the process; they are vascular, tense, unyielding, fibrous; the affection is apt to be acute; the exudation is copious and rapid, accommodation afforded by the recipient texture is insufficient, tension ensues, and, as usual, aggravation follows thereon; suppuration is speedy, and apt to be diffuse; and the pus tends to burrow rapidly, and in all respects destructively, beneath the fibrous structures. Secondly, the part affected is in close and dangerous proximity to the cranial contents; and these are apt to be involved in a secondary, but not less important, disease.

Wounds of the Temporal Artery.

Fig 4.



Compress applied to the temporal artery, after arteriotomy.

Arteriotomy.—Under certain circumstances it is deemed advisable to abstract blood, with a remedial object in view, from an artery, and from one situate in the upper part of the body. The anterior branch of the temporal artery is usually selected. Being quite subcutaneous, it is of easy access; and, being also placed immediately over resisting bone, it is favorably situated for hemostatic purposes. A suitable part of the vessel having been fixed upon, it is steadied by the fingers of the left hand, while a lancet, moved by those of the right, is made to perforate the arterial tube, in an obliquely transverse direction. The entrance and exit of the lancet are managed so as to make the wound of the integument considerably larger than that in the arterial coats; in order that there may be no obstruction to the free escape of blood. A section of the wound, in fact, should resemble that of a cone; the truncated apex corresponding to the aperture in the vessel, the base to that in the integument. When a sufficiency of blood has flowed, it is well to reintroduce the lancet, and to move its point so as to effect complete section of the vessel; in order that contraction and retraction of each orifice may take place, and natural hemostatics may so be favored (*Principles*, 4th Am. Ed. p. 306). A graduated compress is accurately applied over the wound, and retained by a bandage. The dressing should not be disturbed for several days.

If blood do not escape readily enough, a cupping-glass should be applied; care being taken to raise the rim gently over the artery on its cardiac aspect, otherwise the pressure must inevitably arrest the flow. And this is the only mode of cupping which can be considered warrantable in this situation. Use of the ordinary scarificator here leaves a very unseemly scar, especially in the female. The lancet's puncture in arteriotomy is, on the contrary, slight, and its scar scarcely appreciable; and, at the same time, it is to be remembered, that from this one puncture blood will flow much more freely than from all the twelve incisions of the ordinary instrument, if only skin-deep.

In accidental wounds of the temporal artery, deligation is generally preferable to pressure, as already stated. In the case of a mere branch, it may be sufficient to tie the cardiac orifice. But when the main trunk is implicated, the distal orifice must also be secured, otherwise recurrence of hemorrhage is almost certain (*Principles*, 4th Am. Ed. p. 319).

Unpleasant consequences sometimes follow wounds of the temporal artery, whether accidental or intended. *False aneurism* may form. This, usually, has attained to but a small size, ere the patient's attention is arrested by it, and the surgeon's aid sought. In the majority of cases, it is sufficient to put in force the ordinary treatment for recent false aneurism; to cut through the tumor, turn out the clot, and secure the vessel by ligature above and below the wounded point (*Principles*, 4th Am. Ed. p. 520). In those cases to which such procedure may seem inapplicable, removal of the small swelling, by two elliptical incisions, may be had recourse to; securing each of the bleeding points in the ordinary way, and bringing the wound together for adhesion.

On removing the compress, after arteriotomy, the wound may be found to have degenerated into *ulcer*. The ulceration spreads, the vessel is opened, hemorrhage occurs; and, by repetition, the loss of blood becomes hazardous. Pressure, reapplied, may temporarily arrest the flow; but necessarily favors the advance of ulceration, and so renders return of the bleeding certain, on removal or change of the dressing. It is better to abstain from pressure; and to tie the artery on each aspect of the sore; either by regular dissection in the line of the vessel; or, when swelling and condensation of texture render that difficult, by transverse wounds—securing the bleeding points by forceps in the ordinary way. Or, if the ulcer be minute, excision of the changed part may be effected, as for false aneurism.

In connection with this Chapter, consult the ordinary authorities in Systematic Surgery.

CHAPTER III.

INJURIES OF THE CRANIUM; AND THEIR CONSEQUENCES.

By external violence the cranium may be shaken, fissured, or fractured with comminution. In any case, more or less injury is at the same time sustained by the cranial contents. The brain and its investing membranes may be torn, and blood may become extravasated. The inflammatory process may be kindled, perilling life by exudation, suppuration, or chronic change of structure. Or the brain may be merely shaken, and temporarily impaired in its function.

Concussion of the Brain.

In strict acceptation, this term denotes a mere shaking of the organ; without any appreciable lesion of structure, and consequent escape of blood, immediate or secondary. Function is impaired, often most seriously; usually it is after a time restored, more or less completely; yet not without much risk of an inflammatory process intervening, in either the brain or its membranes, to modify, protract, or prevent the fortunate issue. Under the impulse of a blow or fall, the brain must sustain more or less vibration, if the cranium remain entire. It is "a pulpy organ, which exactly fills a nearly spherical bony cavity, whose parietes are elastic in a considerable though very variable degree; and if these parietes sustain any sudden change of shape, their contents must sustain a corresponding amount of compression. As any alteration in the shape of a spherical cavity must lessen its capacity, whenever any external force impinges on the cranium with sufficient violence, it must be flattened at the point of impact, and expanded in some opposite direction; but these changes are, in virtue of the very cause whence they originate, of but momentary duration; the point primarily flattened by the compressing force immediately resumes its original shape, which is necessarily followed by a corresponding return of the expanded portion of the cranium to its previous dimensions. These oscillations may occur several times in rapid succession, their number and extent depending on the elasticity of the cranium, and on the amount and direction of the force applied. In concussion, then, the entire brain sustains a series of vibrations and momentary compressions, varying in number and amount in every imaginable degree in different cases."[1]

The force may be applied either directly or indirectly; the cranium may be the part struck; or the patient, alighting on his feet or nates, may have concussion conveyed to the calvarium through the spinal column.

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[1] *British and Foreign Medical Review*, No. 29, p. 163. See also M. GAMA'S Experiments on this subject. *Traité des Plaies de Tête*, p. 101.

This vibration of the brain, with disturbance of its circulation, and perhaps temporary condensation of its substance, is attended with symptoms of marked disorder in the organ's functions. Sensation, mental power, and voluntary motion are more or less disturbed; and a depressing effect is exerted on the general circulation. The patient, stunned, and more or less insensible, lies motionless, pale, and cold. Insensibility, however, after a time, is found not to be complete except in extreme cases; by loud calling, monosyllabic acknowledgment may be obtained; by pinching the skin, or otherwise causing pain, some eivdence is usually given of pain being felt, and an attempt is made by the patient to move the part from the supposed source of injury. Power of motion is depressed and latent, not destroyed; and the voluntary muscles though relaxed, are not truly paralyzed. Respiration is feeble, slow, and sighing. The pulse is rapid, small, and fluttering; and especially weak at the extremities. The pupils are usually contracted, and insensible to light; but their state is variable; sometimes one is contracted, while the other is either natural or dilated. Squinting is not uncommon. Vomiting is often present; rather of favorable portent than otherwise—premonitory of recovery from this state of depression.

The patient becomes more easily aroused; and responds more distinctly to interrogation, either by words or by gesture. Respiration becomes more full and composed. The pulse is less frequent, and more distinct; but, at this time, the circulation is peculiarly irritable, the mere effort of change of posture usually inducing marked increase in the frequency of the heart's action—or even syncope. Pain now is more felt by the patient; and is referred to the head. Vomiting may continue. The returning mental power is apt to prove errant and deceptive.

Not unfrequently, a state resembling somnambulism continues for some hours during the transition to recovery. Motion, sensation, some of the special senses, and much of mental power, seem to be restored, yet the patient remains as if in a deep sleep. He may rise, wash, shave, dress, perambulate; all the while unconscious.

But reaction seldom stops at mere restoration of the normal state; the boundary of health is crossed, in an opposite direction. Reaction proves excessive; and symptoms are evinced of an inflammatory process begun in the injured part—the brain, its membranes, or both. The pulse becomes full and hard; the skin hot and dry; the face flushed; the eyes bloodshot; the pupils more contracted and insensible to light. Pain, great and increasing, is complained of in the head; restlessness is more and more marked; the mind, which may have in great measure recovered, again loses its healthful balance; delirium supervenes; and so the symptoms advance. Resolution may occur. Or effusion accumulates; coma is induced; and the issue may be fatal.

Practically, concussion may be divided into three stages. 1. Depression; marked by insensibility, and feeble circulation. This may be intense and enduring; proving fatal and that speedily—the patient quite unconscious throughout. 2. Reaction. The symptoms of depression pass off; circulation is restored; and cerebral function returns. In the slighter examples of injury, there may be no further progress made untowardly. Reaction does not prove excessive. The head is confused and giddy for a day or two; but the pulse remains quiet; and, within a few days more, all has passed off in safety. 3. Excessive reaction. The inflammatory symptoms set in, and a state opposite to that of depression is established; all is excitement and perversion, both in the general circulation, and in the functions of the brain; and life is brought into imminent jeopardy, by phrenitis, or meningitis, and by proportionate inflammatory fever.

Treatment.—This necessarily varies according to the severity of the injury and the intensity of its results; but more especially is it different at different periods of the case. A man stunned by a blow or fall, and laboring under simple concussion, is often bled on the instant—or an attempt, at least, is made to bleed him—by the rash and thoughtless practitioner. In other words, a fresh and powerful agent of depression is exerted on the general circulation, when such depression is already great, and has probably brought life to the very verge of extinction. If blood flow from the wound in venesection, under such circumstances, perhaps life is lost; at all events, the direct untoward result of the injury is aggravated; and the case is rendered both more urgent and more protracted than it otherwise would have been. The lancet is certainly not to be used, during this stage. In many cases we should be little more than passive spectators. The depression is not extreme, nor giving indications of long continuance; signs of reaction, on the contrary, are slowly manifesting themselves; and we await the natural progress of events. Not altogether idle, however. Although not engaged in active treatment, we are prepared for activity, when circumstances shall call for our interference. The patient is stripped and put to bed. His whole body is carefully examined. He cannot tell us whether or not other parts have been injured. Besides an anxious investigation as to the existence or not of internal injuries (*Principles*, 4th Am. Ed. p. 92), we must carefully examine each joint and bone; detecting fracture or dislocation, and having it immediately rectified, while circumstances are all so peculiarly favorable for the required manipulations (*Principles*, 4th Am. Ed. p. 640). On recovering his senses, he has not to complain of a painful and distorted limb, now for the first time observed; but finds what was distorted duly replaced, and already some way advanced in the process of repair. The head is carefully shaved; and is placed on pillows, considerably elevated. If wound of the scalp exist, hemorrhage is arrested, if need be; and approximation is effected in the ordinary way.

Should the depression prove great and continued, plainly indicating risk to life by syncope, something more is required of the practitioner. He endeavors gently to originate reaction. Warmth is applied to the surface; and friction is used over the chest and abdomen. If this be not sufficient to turn the course of the symptoms, a stimulant enema of turpentine is given. If still the progress be downwards, an attempt is made to convey to the stomach some warm tea, or soup, or wine and water; and stimulants are held to the nostrils, for insufflation. These last, however, are always to be warily managed, so as to avoid risk of injury by their too free application to a patient at the time insensible of pain; and the giving of fluids by the mouth, too, must be effected with care, lest they pass into the air-passages, and produce asphyxia. So soon as reaction has begun, we cease from our auxiliary efforts; and again become passive onlookers; completion of the second stage being always safest in the hands of Nature.

If stimulants are used at all internally, it must be only in urgent circumstances, and with much caution; begun with a sparing hand, and repeated warily. And, in general, we are well content to do nothing, in this way; knowing that moderate depression is a favorable occurrence; and that premature cessation of it, especially when followed by abrupt and marked reaction, is apt to prove most injurious. For, at first, we can never be certain that the case is one of pure concussion. There may be a lesion, by laceration, of the brain's substance. During the existence of concussion's first stage, the case remains—practically—one of concussion still; circulation is weak in the torn part, as elsewhere; extravasation of blood does not take place from the open vessels; valuable opportunity is afforded for their closure by natural hemostatics; and when at last—it may be after a considerable number of hours—the natural reaction slowly sets in, and circulation is proportionately restored, still no escape of blood occurs; and the symptoms may remain those of mere concussion to the last. Whereas, had the period of depression been abridged, and reaction rendered not only premature, but also abrupt and active, circulation would have been restored in the injured part ere the open vessels had closed, blood would have been extravasated, and compression of the brain must have ensued. Or, even if no lesion of the brain have occurred, the case being in all respects one of mere concussion, still premature and excessive reaction is most hazardous; by tending not only to kindle an inflammatory process in the brain or its membranes, but also to secure its being of an aggravated and perhaps uncontrollable character.

Thus, then, it is plain that two great errors may be committed in the treatment of the first stage of concussion. Blood may be drawn prematurely; lowering the vital powers still further; unnecessarily, untowardly, perhaps fatally. Or stimuli may be imprudently employed; too soon, and too freely; hurrying on reaction; and endangering life, either by compression in consequence of extravasation of blood, or by an inflammatory process of an urgent and untoward character. Let both errors be studiously avoided; for each is of a most grave nature. While we take care that the depression does not proceed too far, let us beware of doing anything to effect either a premature or an excessive reaction. And when we attempt to fulfil the former indication, let us beware both of inducing asphyxia, by the misconducting of ingesta; and of causing troublesome excoriation and subsequent inflammation in susceptible and important parts, by the spilling of irritant stimuli upon them.

In the second stage, while reaction is in progress, we have either hand ready—to favor, or to repress—yet very often find it prudent to abstain from active interference; leaving the task, almost entirely, in the more skilful and competent hands of Nature. We content ourselves with carefully excluding all source of excitement, either to the general circulation, or to the brain's function—more especially light and noise; and cold is continuously applied to the shaven scalp, by wetted cloths, or by evaporating lotions. Such treatment is not calculated either to thwart or to prevent the normal amount and form of reaction; while, at the same time, it leans to the side of repression sufficiently, to guard against the excess of reaction which not improbably is speedily to threaten.

It may happen that though the reactive effort is well begun, it ceases, flags, and retrogrades; a period of depression again sets in; and this relapse looks more formidable than did the first effect of the injury. Under such circumstances we are no longer inactive spectators; but commence a cautious system of stimulation, as formerly explained. If, on the other hand—as more frequently happens—reaction threatens to prove both "fast and furious," we interpose our repressing agency. We empty the bowels by the exhibition of an aperient enema; and aid this, by the more leisurely working of an internal purge. Seclusion from light and noise, elevation of the head, and continuous application of cold, are most carefully maintained. And if still the action is sthenic and in excess, we prepare to obtain a sedative result by bloodletting.

In the third stage, when reaction is plainly in excess, and inflammatory symptoms are fast developing themselves, the treatment is decidedly and actively antiphlogistic. Quietude and seclusion are more strictly enforced than ever; it being all-important to obtain *rest* of the organ affected, as completely as circumstances will permit. Blood is taken from both the system and the part; by venesection or arteriotomy, and by leeching. And such depletion is repeated as oft and as freely as circumstances seem to demand. Purgatives are actively administered; and it is well to remember that in inflammatory affections of the cranial contents, especially, powerful doses are required. Antimony, or aconite may be given. But when the substance of the brain is plainly indicated as the site of the crescent inflammatory process, we do not hesitate to place the system rapidly under the influence of mercury; having full warrant for this in the delicacy of structure and importance of function which are involved (*Principles*, 4th Am. Ed. p. 153). Calomel is given in small doses, frequently repeated; and, usually, it is neither necessary nor expedient to combine it with opium. Not necessary, for there is a sluggishness of action in the intestinal canal, engendered by the disease, and consequently but little risk of the mineral proving purgative; and not expedient, lest we endanger the production of narcotism, and consequent determination of blood to the part affected.

Sometimes delirium, with convulsive movements, continues after full bleeding, and is aggravated by its further repetition. In such circumstances, the pulse and other characteristics of nervous reaction (*Principles*, 4th Am. Ed. p. 140) will be found; and relief will follow the exhibition of opium, guarded by antimony (*Principles*, 4th Am. Ed. p. 151). In the antiphlogistic management of advanced cases of injury of the head, the occurrence of convulsions is by no means to be considered as sufficient warrant for continuance and *pushing* of the antiphlogistics

—especially bloodletting; for, often, they are found to be of an asthenic, or purely nervous character; aggravated by antiphlogistics, alleviated and checked by amendment of diet, and cautious exhibition of opium.

The brain and membranes, having recovered from the inflammatory process, remain long weak, and require still a watchful and patient care. Light and noise must not be soon or abruptly admitted. Conversation, reading, thought, or other exercise of the mental powers must be discouraged. Even the functions of special sense should be held in comparative abeyance. The head is shaved, elevated, and kept cool. Food is sparing and non-stimulant. The bowels are kept freely moving.

If resolution do not occur, effusion takes place; compression of the brain supervenes on the concussion; coma is formed; and the case becomes one of the utmost danger. There is now no tolerance of active antiphlogistics. The lancet is laid aside. Purging is cautiously continued. And the main reliance is placed on powerful counter-irritation.

Even without effusion, recovery from concussion is often tedious, and imperfect. The eye remains wild and vacant in expression; memory is impaired; conversation is childish, and often incoherent; sometimes the demeanor is timid and gentle; sometimes the patient is very irascible, and apt to be moved to much violence. In short, there remains an imbecility of the whole mental powers. In other cases, certain only of the mental faculties thus suffer; and of these, memory is the one most frequently affected. Sometimes the recollection of all past events is either lost or obscured; sometimes a portion of these remain tolerably vivid and distinct. Sometimes the past is untouched, and the present only affected. Extraordinary results have occurred, in regard to languages; when the knowledge of a plurality of these have been previously possessed by the patient. Certain of them have gone quite from him; and on recovery from the first effects of concussion he has spoken with fluency, and continued to do so, in a tongue to which he had been long a stranger.[1]

Again, intellect may remain clear and entire, while special sense sustains an injury. Hearing and smell may be lost, impaired, or perverted. Weakness of sight, with or without squinting, is no uncommon result.

Such remote and chronic consequences of concussion may prove but temporary; or they may remain for life. The affections of the mind are especially liable to prove obstinate; and ought always to receive a very guarded prognosis. The treatment found most suitable consists in a mild alterative mercurial course, with moderate and long-continued counter-irritation; a uniformly lax state of the bowels, and occasional purging; a most carefully regulated diet; restriction to moderate exercise of both body and mind, but more especially of the latter; avoidance of all sources of mental excitement, especially of such as are known to be besetting to the patient; the use of the cold shower-bath; and residence in genial exposure and climate.

Many patients recover, to all appearance, perfectly from concussion; and yet are subject to frequent and unpleasant remembrances of the injury. On attempting any unusual exertion, either of mind or body, or on the occurrence of any otherwise trifling stomachic or intestinal disorder, intense headache supervenes, with some fever, and perhaps attended with disorder of sight or other special sense. Or, by even slight indulgence in wine, they are liable to undergo great mental excitement, little short of temporary delirium or insanity. Such persons, it is obvious, ought to pay great attention to regimen, to the state of the bowels, and to the avoidance of all circumstances likely to excite, or cause determination to the cranial contents. Indeed, it may be laid down as a safe general rule, that all who have once sustained any considerable concussion of the brain must ever after regard their head as a weak point, which requires constant prophylactic care. And, for some time immediately succeeding the infliction of the injury, this truth should be more especially forced upon them. For, many most serious cerebral disorders have been the result of premature return to bodily exercise, mental occupation, or pleasures of the table, after a concussion thought at the time to be but trivial.

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[1] Sir A. Cooper's Lectures, p. 112.

A very insidious, and consequently dangerous, affection of the brain is apt to ensue as a remote consequence of concussion, more especially in young people. A slight injury of the head has been received, by a blow or fall; and its immediate effects seem to be satisfactorily recovered from. Weeks—or, it may be, months—afterwards, the patient is out of health; he loses color, appetite, flesh, and energy both of body and mind; he is subject to headache, and occasionally complains of giddiness; the skin is dry and feverish; the secretions are altered; the eye has an unwonted expression, rather of languor than of excitement; the stomach is irritable, and occasionally rejects food; sleep is disturbed and unrefreshing. The ordinary remedies, directed to stomach, skin, and bowels, fail to relieve. The general ailment continues slowly to advance. By and by, the head symptoms assume a pre-eminence; and at no distant period from that event, symptoms of pressure on the brain become plainly manifest. Most probably the issue is fatal. An inflammatory process has been slowly advancing in the cerebral substance; suppuration has at length occurred; and, in consequence, it is not unlikely that an acute accession has supervened on the previous chronic change of structure.

It is very obvious how the inobservant practitioner must be apt to mistake the true nature of such cases. The head is not suspected of originating the evil, until towards the close; when treatment, however suitable, can prove of but little avail. Diet is attended to, laxatives are given, then alteratives; and then, probably, tonics; all without relief; the last class of remedies inevitably inducing marked aggravation of the disorder. It may be that the treatment is from the first of a tonic nature, and blindly persevered in, notwithstanding its manifest failure; the result is consequently still more untoward; and coma is rendered more early, more urgent, and more hopeless, than it otherwise might have been. The treatment, on the contrary, should be such as to to counteract a chronic inflammatory process; conducted with such care and skill as the importance of the texture implicated so imperatively demands. Leeches are applied to the temples or occiput; and are repeated, perhaps, once and again. The head is shaved, and moderate counter-irritation is patiently maintained. A mild course of mercury is given. The intestinal and other excretions are attended to. Diet is sparing, and most carefully regulated. All excitement of both body and mind is avoided. And such treatment must be duly maintained, notwithstanding the patient, or other inexperienced observers, may not scruple to say that its rigor is quite disproportionate to the importance of the case. The surgeon knows the insidious and covert nature of the evil with which he is called upon to cope; and is not deceived by appearances. His main difficulty may lie in enforcing the measures which he knows to be essential. It were well that patients were in general as fully convinced, as are the members of the medical profession, of the truthfulness of the axiom, that "no injury of the head is too slight to be despised;" and that whenever any serious concussion has been sustained, the greatest prophylactic caution is expedient, long after the infliction of the injury.[1]

It is needless to expose the unsuitableness of the operation of trephining, in all cases of simple concussion.

Compression of the Brain.

It is unnecessary here to consider the question, Whether the substance of the brain is capable of condensation by pressure or not. We know that pressure applied to it, according to its suddenness and intensity of application, produces derangement of the functions of that important texture; and the consequent train of symptoms, varying in degree, are usually termed those of "compressed brain," or of "compression."

In concussion, the whole brain is affected; in compression, a portion only may be acted on. In the one case, the cause of disorder is of temporary application; in the other, it is of some duration. The symptoms, therefore, may naturally be expected to differ. In concussion, the depressing effect on the heart and general circulation is immediate and prominent; and the patient lies pale, cold, and pulseless. In compression—the injury being usually limited to but a part of the brain—the heart's action may, at first, be little if at all affected; the skin consequently, may retain its natural warmth and hue, and the pulse its fulness. In concussion immediately fatal, death takes place by syncope. In compression, the fatal result is due to coma. The essential peculiarity of the latter is, "that respiration takes place imperfectly, and ultimately is suspended, probably by reason of the defect of sensation. The circulation, and sometimes the animal heat, not only continue entire up to the moment when the last breath is drawn, but even survive the respiration for a short time; during which time, of course, venous blood moves along the arteries; but the venous blood, according to the general law established in the physiology of respiration, soon ceases to make its way through the capillaries of the lungs, and the circulation is therefore soon brought to a stand . . . . . . We know from physiology, that the part of the nervous system which must be specially affected in these cases, when the failure of respiration is the immediate cause of death, must be at the sides of the medulla oblongata; but the part visibly injured is often considerably distant from this."[1]

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[1] "It will in general be found very difficult to persuade a person who has had what may be called only a knock on the pate, to submit to discipline, especially if he find himself tolerably well. He will be inclined to think that the surgeon is either unnecessarily apprehensive, or guilty of a much worse fault; and yet, in many instances, the timely use or the neglect of this single remedy (bloodletting) makes all the difference between safety and fatality."—POTT, i, 47.

Pressure may be made on the brain in various ways. By extravasation of blood; in its substance, on its surface, or between the membranes. By formation and accumulation of pus, or other products of the inflammatory process; also, either cerebral or intra-membranous. By fracture of the cranium, with depression of the broken part or parts. By lodgment of foreign bodies in the brain, or on its surface. By the formation of adventitious growth, in connection with either the cranium or its contents; exostosis, osteosarcoma, or osteocephaloma of the cranium; tubercular, or other tumor of the brain or its membranes. It is probable that compression is also occasioned by mere congestion; a state of over-distension of the bloodvessels, with advancing serous effusion.

It is highly important to bear in remembrance, that symptoms precisely similar to those ordinarily produced by compression of the brain may be, and frequently are, induced by other circumstances, when no apparent pressure is in operation. Certain poisons, for example, have this effect. But what is of more consequence in a surgical point of view, such a train of symptoms almost invariably attends on disorganization of the cerebral tissue by inflammation; and that, too, when the inflammatory products seem to be of such a nature as not to occasion pressure in any great degree.

In surgery, we have chiefly to do with those examples which are induced by depressed fracture, extravasation of blood, inflammatory exudation, and suppuration.

The most characteristic symptoms are found affecting the respiration and the pulse. Breathing is slow, laboring, and loudly stertorous; in concussion it was gentle and sighing. A peculiar whiffing, by the mouth, is not unfrequent during expiration—as is observed in smoking, or in the ordinary repose of heavy sleepers; it is a symptom of untoward portent. The pulse is distinct and full, usually slow, but often at first not much altered as to frequency—not unfrequently intermittent; in concussion it was from the first rapid, low, and feeble, perhaps wholly imperceptible. Loss of consciousness is more complete than in concussion; the patient cannot be roused by any movement or noise. Loss of sensation is more complete; he may be pinched, or burnt, without in any way evincing perception of pain. Special sense is wholly dormant; he neither sees, nor hears, nor smells; at least no result follows the application of stimuli to the eye, ear, or nose. Power of motion is wholly gone; the voluntary muscles are relaxed, flabby, and powerless; the limbs lie loose and incapable of motion. The eye is fixed; its pupils are dilated and insensible to light. The skin is of a normal temperature, or perhaps even warmer; not unfrequently wet with perspiration; in concussion it was cold, pale, and shrunken. The sphincters are relaxed; fæces pass involuntarily. Expulsive muscles are similarly affected; the urine is, in consequence, retained; or from paralysis of the sphincter as well, the urine may pass off involuntarily, not in a stream, but by drops.

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[1] Alison, Outlines of Pathology, p. 8.

Such is the general character of the symptoms peculiar to compression; varying, of course, in degree, according to the amount or nature of the injury sustained. They are of immediate or secondary accession, according to the cause; immediate, when the consequence of sudden hemorrhage, or depressed bone, or impacted foreign body; secondary, when the result of tardy extravasation, suppuration, or inflammatory exudation. However originating, they are, after a time, masked and modified by the results of the inflammatory process which seldom fails to become established in the injured part.

But the brain has the power of recovering from the effects of pressure to a certain extent, even although the agent of compression undergo no alteration; the organ seeming to accommodate itself gradually to its change of circumstances. Thus, in depressed fracture, symptoms of compression may be at first marked and even urgent; and yet may pass off in a day or two, without any elevation of the depressed portion of bone. This being borne in mind, we can readily understand how, by the time that the inflammatory process has begun, the symptoms of compression, at first considerable, may have in a great measure passed away; and how the case, consequently, may for a time present only the ordinary symptoms of urgent inflammation in the brain and its membranes. This is something more than mere masking of compression by the inflammatory process; it is supersedence. Certain functions of the brain are plainly re-established, though perverted; convulsive movements of the limbs occur, and delirium may supervene.

Compression may, like concussion, prove directly fatal; the patient perishing by coma. Or—when the cause of pressure is removed, or even, as already stated, independently of this—the symptoms gradually abate, and the patient slowly recovers. Or, ere yet any great mitigation in the symptoms of compression have occurred, those of an urgent inflammatory process kindled on the injured part become established; and these prove fatal. Or, a similarly fatal issue may take place, through inflammation, even although the immediate effects of compression had seemed to have been recovered from.

The indications of treatment adapted to compression are sufficiently simple. To remove, if possible, the compressing cause. To watch the subsequent favorable progress of the organ to resumption of its normal state and function. To interfere, if need be, to avert inflammation. And to oppose the untoward advance of this, when unfortunately it has become established. When symptoms of simple compression persist, without any opportunity being afforded of removing the cause of pressure, to maintain by suitable means the action of the heart and lungs; so as, if possible, to afford time for the brain, by accommodating itself to its altered circumstances, slowly and imperfectly to resume its functions.

Between pure examples of Concussion and Compression of the brain there is no difficulty in drawing a sufficiently broad distinction; in practice, as well as in theory. The one, a case of syncope; the other, of coma. In concussion—the symptoms immediate; insensibility usually incomplete; the organs of special sense capable of being roused; the muscles contractile, and the limbs, under strong stimulus, undergoing movement; the breathing soft and gentle; the pupils not uniformly dilated, though insensible to light; the pulse rapid, small, indistinct, perhaps for a time imperceptible; vomiting; no involuntary evacuations; the skin cold, pale, and shrunk. In compression—the symptoms not necessarily immediate; insensibility complete; the organs of special sense incapable of being roused; the muscles relaxed, paralyzed; the limbs motionless, until recession of the state of compression, and advance of the inflammatory process; breathing labored, slow, and snoring; the pupils dilated and insensible; the pulse slow, distinct, perhaps full, sometimes intermittent; no (or seldom) vomiting; fæces passed involuntarily; retention or dribbling of urine; the skin warm, and often bedewed by perspiration.

But it is very plain that comparatively seldom will pure examples of either state be presented to the surgeon. The blow or fall which produces severe concussion, is very likely to cause also laceration of the substance of the brain, or rupture of a vessel in the membranes, whence blood will escape, sooner or later, inducing a certain amount of compression. And, on the other hand, the injury which causes compression, whether by fracture or extravasation, must, at the same time, and primarily, have caused more or less concussion. In consequence, the two states, and their corresponding symptoms, are often—nay, usually—more or less commingled. According to the preponderance of either class of symptoms, the case receives its title; and, sometimes, it is not easy to say to what side the preponderance is inclined.

There is one class of cases, however, sufficiently distinct. The ordinary symptoms of concussion follow an injury of the head, and the patient rallies from them. Consciousness is completely restored, and is retained for some time. But without the operation of any new external cause, insensibility returns; unconsciousness is more complete than before; and the symptoms now will be found presenting the characters of coma. Here is a combination of concussion with compression; yet there is no difficulty in separating the case into its two component parts. The first insensibility was that of concussion; the second is undoubtedly due to compression. If the interval of consciousness have been brief—of hours—the compressing agent is, doubtless, extravasated blood; if it have been of considerable duration—days—the compressing agent is pus, or other inflammatory product.

It is right also to remember that, not unfrequently, part of the insensibility attendant on injuries of the head may be attributable to intoxication; and that although this influence is of a transient nature, and to that extent favorable, yet that it predisposes to inflammatory accession.

Compression by Extravasation of Blood.

Escape of blood may take place, immediately on infliction of the injury; or not until reaction has followed the direct effects of concussion. During the depressed state of circulation which obtains during the first effect of the injury, no blood may escape from even extensive cerebral laceration; but if reaction be both speedy and intense, even the slightest lesion will be certain to afford a dangerous amount of that fluid.

The extravasation may be variously situated: between the skull and dura mater; between the membranes; on the surface of the brain—on its hemispheres, or at its base; within the ventricles; or infiltrated into broken-up cerebral substance. For practical purposes, it is sufficient to divide compressing extravasations into two great classes: those which are exterior to the dura mater, and those which are within that membrane.

I.—*Extravasation between the Bone and Dura Mater.*

One of the effects of a fall or blow on the head is, by disruption of the soft parts constituting the scalp, to produce more or less swelling by sanguineous infiltration of that texture. Occasionally, a similar result is produced on the internal aspect of the part of the cranium struck, in the areolar and vascular connections of the dura mater with the bone. These being torn, escape of blood follows; either at the time, or subsequently on reaction; or at both periods; sparingly at first, more profusely afterwards. If any considerable vessel have been torn, the extravasation may be expected to be both instant and great. By such abnormal accumulation of blood, the dura mater is proportionally bulged inwards; and compression of the brain necessarily results. The blood, as in other examples of extravasation, is at first fluid, but sooner or later assumes the solid form; or, rather, by coagulation it separates into clot and serum.

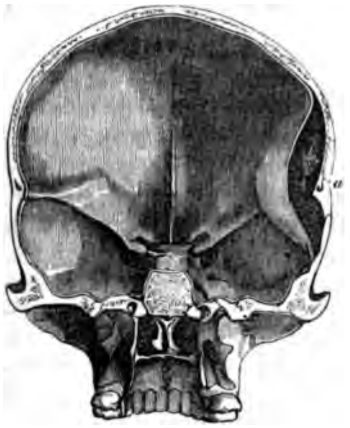
Extreme cases of this nature, it is plain, are most likely to occur when the injury has been inflicted in the course of the middle meningeal artery. And, to occasion rupture of that vessel, it is not essential that fracture of the superimposed bone should take place. Mere concussion may suffice. If compound fracture exist, the blood is more likely to escape externally, than to accumulate, to any inconvenient amount, between the bone and membrane.

As indications of the event:—In addition to the ordinary symptoms of compression, we have the peculiar site and nature of the injury. A smart blow has been received in the course of the meningeal artery; and is speedily followed by urgent symptoms of compression.

Such compression may be so grave as to cause death, by its direct effect. Or, farther escape of blood ceasing, the brain begins to accommodate itself to the amount of pressure already applied; at the same time, the compressing agent is being gradually diminished in bulk by absorption of the extravasated blood; and the patient slowly recovers. Or the inflammatory process is kindled after a time; and unhealthy suppuration is apt to ensue; reinducing symptoms of compression, more urgent than before, after perhaps a considerable interval of consciousness.

Treatment.—When the circumstances of the case are such as to leave little doubt as to the occurrence of this form of extravasation, at an accessible and defined portion of the skull, we can have no hesitation—if the symptoms of compression are urgent—in using the trephine; for the purpose of exposing the site of extravasation, and effecting relief by evacuation. If the blood be still fluid, it escapes at once; if coagulated, the solid portions may, if need be, be detached by a probe—delicately used.

Fig. 5.



Extravasation of blood, separating the dura mater from the cranium, at the ordinary site; by rupture of the middle meningeal artery, *a*.

Unfortunately, we cannot be certain, in almost any case, of the exact site of the extravasation; and, consequently, both our operation and prognosis require to be extremely guarded. A concussing blow operates chiefly on two parts of the cranium; the part struck, and the part immediately opposite; the one effect often termed the *coup*, the other the *contrecoup*. It not unfrequently happens that extravasation takes place in the latter situation; not at the part struck. But failing in our search at one point, we are scarcely warranted in making a similar attempt at the other; for the extravasation may yet be elsewhere, in a site not ascertained, and perhaps inaccessible.

If the symptoms of compression be not urgent, we do not interfere by operation. The brain gradually recovers. The extravasation is slowly absorbed. Our duty is to avert inflammation, if possible, by the ordinary means; to moderate it, should it occur.

II.—*Extravasation of Blood on, or in the Brain.*

As already stated, the blood may be variously situated; intra-membranous; diffused on the surface of the hemispheres, or at the base of the brain; within the ventricles; or infiltrated into the cerebral tissue. And, unfortunately, the most careful examination of the history, symptoms, and progress of the case, will often not enable us to ascertain, with anything like certainty, the exact site of the evil.

The symptoms, are those of compression; more or less urgent in their character, and more or less speedy in their accession, according to the site, amount, rapidity, and time of the extravasation. Usually, the escape of blood is not immediate—at least to such an extent as to cause symptoms of decided compression—but secondary, on the occurrence of reaction. The patient may have been from the first insensible, by concussion; and this minor insensibility may be simply merged in the major insensibility of compression; or between the two there may be a greater or less interval of consciousness. The cerebral or membranous lesion, which permits the sanguineous escape, may follow on a concussive injury of the cranium; on extensive fracture of the cranium, with or without depression; on mere fissure of the skull—more especially when this is situate at the base; or on a penetrating wound, of any kind.

There is the same prognosis as in the case of extravasation exterior to the dura mater. The brain may recover, and the extravasation be absorbed; or the brain, recovering partially from compression, suffers, perhaps fatally, by inflammatory accession—immediate or remote; or the compression is most urgent, and directly terminates existence by coma. Rapidity of extravasation is more important than the amount; and the site of the escape is of more consequence than either. A comparatively small quantity of blood rapidly, or at once, extravasated, will induce more urgent symptoms of compression than twice the amount which has slowly oozed from the torn vessels; and while a large flat coagulum may press with comparative impunity on the upper and anterior part of the hemispheres, a slight amount of blood acting on the base of the brain—more especially at its posterior part—never fails to induce the most serious and urgent consequences.

Treatment.—Prevention may be in our power. Concussion may occur, along with slight lesion of the cerebral substance; and from this lesion little or no blood may escape during the period of depression. The injury having been such as to engender a suspicion of these circumstances, it is plainly our duty to protract and repress reaction; when it does occur, to endeavor that it proceed slowly and calmly; or, if need be, by bleeding from the system, to reinduce the state of depression, and maintain it during a second period. The object being, to afford time and opportunity for efficient occlusion of the injured vessels by natural hemostatics. If too late, or otherwise unable, to prevent; we may yet hope to moderate and limit the extravasation. And this is to be effected by opposing reaction; keeping the patient quiet, with the head elevated; applying cold to the head, face, and neck; interdicting all nutritive ingesta; taking blood from the system, as circumstances may require; and acting freely on the bowels by purgatives. Our object still is to have not only the general circulation quiet and gentle, but to have blood circulating within the cranium as sparingly and as calmly as is compatible with such maintenance of the cerebral functions as is essential to life.

Extravasation having ceased, we hope that in due time the symptoms of compression will begin to abate; the brain accommodating itself to the compressing agent, and this latter beginning to diminish by absorption. We ward off inflammatory symptoms, should they threaten; and maintain strict rest, quietude, and regimen; the last being very rigidly limited in regard to both fluids and solids, in order that there may be a state of system not only unfavorable to inflammatory accession, but also favorable to absorption of the extravasated blood. Unfortunately, we have no direct means of assisting in the latter indication.

A paramount indication undoubtedly is, removal of the compressing cause, the extravasation. This can be artificially effected only by operation; by removing a portion of the cranium; puncturing the membranes, if need be; exposing the site of extravasation, and permitting—if not effecting—external discharge. Were the operation of trephining capable, always, or even often, of achieving this result, it would be held as generally advisable in such cases. As it is, however, the profession is much divided upon the question; some in favor of, others opposed to the proceeding. Among the latter we would beg to be enrolled; and for the following reasons:—1. It is difficult, if not impossible, to determine at what part of the *periphery* of the cranial cavity the extravasation has occurred; whether at the point struck, or at the site of the *contrecoup*, or at some other part—superiorly, or laterally, or at the base. 2. It is equally difficult, if not impossible, to determine previous to the operation, at what part the extravasation has occurred as regards the *diameter* of the cranial cavity; whether between the membranes, on the surface of the brain, within its ventricles, or in its broken-up tissue. 3. Supposing that the extravasation has been reached and exposed, it may be found either difficult or impossible to effect its removal. Coagulation has taken place. The fluid portion trickles away at once; but the clot is expanded in the form of a flat and broad cake, which cannot be dislodged and extruded without the infliction of such further mechanical injury as shall render the occurrence of disastrous inflammatory action inevitably certain. 4. Supposing that the coagulum has been exposed and not removed, the patient is obviously much more unfavorably situated after than before the operation. Now there is a certainty of inflammatory accession—in addition to the unrelieved evil of compression; and, under the combination, it is but too likely that life may give way. Before, there was but the compression; inflammation might have been averted; the brain, by accommodation, might have gradually recovered.

Thus, then, we hold, that in the case of compression by extravasated blood, the operation of trephining is to be considered as generally inapplicable. Operating, we are uncertain whether or not the trephine is over the site of extravasation; we are uncertain whether it may be necessary to puncture the membranes of the brain—and, that having been done, we may still fail in exposing the blood; we are uncertain of being able to remove the blood, even after it has been exposed; and we are almost certain to light up an inflammatory process of a most urgent, and perhaps unmanageable character. In other words, we are sure to inflict injury—by perforation, and exposure; we *may* succeed in counterbalancing this injury by a preponderating amount of benefit—by extrusion of the compressing agent, the escaped blood; but we are fully more likely to fail in obtaining the contemplated advantage; and then the proceeding proves to be altogether injurious.

But to all general rules there are exceptions. And here the exception consists in those cases of injury applied in the course of the middle meningeal artery, immediately followed by urgent symptoms of compression, with or without fracture of the skull, in which we can have little doubt of the following circumstances:—1. That the compression is caused by extravasation of blood; 2. That the blood has been extravasated at or near the point struck; 3. That the extravasation is situate exteriorly to the dura mater; 4. That the blood is yet mainly fluid, and therefore likely to escape readily outwards, on an aperture of communication being established; 5. That even if it have coagulated, extrusion may yet be effected, without necessarily exciting inflammation, either in the brain or in any of its membranes. Under such circumstances, we need not hesitate to apply a trephine to the injured part—when the symptoms of compression are sufficiently urgent to demand direct interference—with the full hope of affording most important and salutary relief.

We can also conceive it possible, that an injury may be sustained at a part of the cranium not connected with the course of the meningeal artery; that the symptoms of compression by extravasation may be both very urgent and very plain; and that the surgeon, after careful examination and consideration of the case, may feel satisfied that the site of extravasation corresponds to the part struck. The trephine is applied. If blood be found at that part, exterior to the dura mater, the issue is most fortunate. But if no blood be found, two questions naturally arise: Are the membranes of the brain to be perforated? or is another part of the cranial contents to be exposed by reapplication of the trephine? The latter question is certainly to be answered in the negative; the former, in the affirmative, only when the dura mater is elevated through the trephine-hole, tense, comparatively non-pulsating, perhaps fluctuating, or otherwise affording tolerably distinct evidence of the sought-for blood being lodged beneath.

Compression by the Accumulation of Pus between the Cranium and Dura Mater.

Such an occurrence may be preceded or not by sanguineous extravasation. There may be at first disruption of the dura mater from the internal surface of the cranium, with accumulation of blood between; perhaps to such an extent as to cause compression of the brain. This organ slowly recovers; and the patient seems convalescent. But, after some days, the inflammatory process is kindled in the injured part; suppuration occurs, and the internal bruise degenerates into an unhealthy abscess.

Or there may be no previous extravasation. The bone and dura mater sustain a shock by the injury, but undergo no disruption either of themselves or of their connections. There may be at first some symptoms of concussion, and these pass away; but convalescence is interrupted by febrile disturbance of the system, followed by symptoms of compression. The inflammatory process has been established in the cranium, in the dura mater, or in both; and abscess forms between. The inflammation may have originated in the membrane, or in the connections of this with the bone, or in the bone; or it may have begun in the diploë, causing abscess there, and extending inwards; or the origin may have been exterior to the cranium, in the soft parts, secondarily involving the corresponding portion of the interior.

If a portion of the cranium have been rudely stripped of its pericranium, it may die; but it does not necessarily do so—as was formerly stated. Should necrosis take place, and involve the whole thickness of the skull at that point, there is necessarily detachment of the dura mater, interposition of pus between it and the bone, consequent bulging inwards of the membrane, and proportionate compression of the brain.

But detachment of the pericranium, with advancing necrosis of the external part of the bone, does not necessarily imply a corresponding state of matters within. The issue may be, and often is, merely an external exfoliation.

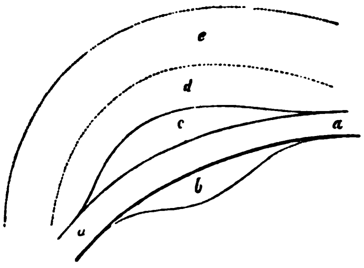
The dura mater is a more important and efficient membrane than the pericranium, as regards vascular nutrition of the bone. Detach the dura mater, and the bone may hardly live; strip off the pericranium, and exfoliation is by no means inevitable.

If the injury have not only denuded the external table of its investing membrane, but have also removed, at a corresponding point, the dura mater, by disruption and consequent extravasation, necrosis of the portion of bone so circumstanced, necessarily involving accumulation of pus between the dura mater and cranium, is inevitable. Also, if the dura mater be alone detached, and subsequently suppurate, necrosis of the entire thickness of the bone is still more than probable; though there may not be even an external wound.

However occasioned, the symptoms of compression from this cause differ very obviously from those produced by extravasation of blood. They are not of early occurrence; days, and sometimes weeks, elapse between their accession and the infliction of the original injury. Whereas, compression by escape of blood is either immediate, or removed from the time of infliction only to the extent of a few hours, at the utmost. Also, in the case of abscess, the symptoms of compression are invariably preceded by signs of the inflammatory process which causes the suppuration. As regards the result, the difference is still more striking. In compression by blood, the extravasation may cease, the blood is absorbed, and the brain recovers. But, in compression by pus, the compressing agent is ever on the increase; the abscess enlarges more and more; and pus is but little amenable to absorption. The bone is exfoliating, and, if it were separate, the matter would doubtless find an outward escape; but exfoliation is a tedious process: ere it has been accomplished, the membrane, growing more and more tense, and itself involved in structural change, ulcerates, or sloughs; purulent irruption takes place inwards; and a more extensive, serious, and uncontrollable inflammation necessarily ensues. Or, previous to the giving way of the dura mater, a minor yet equally fatal inflammatory extension inwards, by contiguity, may have occurred. Or a sad complication may take place, by invasion of all the symptoms of pyæmia. Or, independently of any such aggravations, the primary evils of fever and compression may prove fatal.

The symptoms denoting formation of this dangerous abscess are twofold: as affecting the system; and as affecting the part. A man receives an injury of the head, without fracture of the cranium. He may undergo concussion, or compression by extravasation; one or other, or both; or he may not. If he does so suffer, he rallies; and, for a time, seems advancing favorably towards complete recovery. But, after some days, he becomes restless, wakeful, and generally uneasy; his pulse rises and gets hard; the skin is hot and dry; and the other symptoms of inflammatory fever present themselves—moderate or intense, obscure or manifest, according as the inflammatory process happens to be chronic or acute; very frequently it is the former. Pain is complained of in the head; the eyes change their expression; and the cerebral functions begin to evince disorder. Rigor occurs, and is repeated. Suppuration is begun; and then supervene, more or less rapidly, the symptoms of compression—masking, in their turn, those of the inflammatory character. Then, as to the part. The bone is in a state of necrosis; and this condition will certainly be indicated externally. If there be a wound, the granulations, instead of presenting the appearance of health and healing, will disappear, or become pale and glassy; and the discharge may for a time cease—returning thin, non-laudable, perhaps sanguineous. If the pericranium be exposed, it will be found separating more and more from the bone beneath, with pus interposed. If the bone be denuded, it will be found white, dry, sonorous, non-vascular—in fact, at first dying, and speedily dead. If the scalp have not been divided either by accident or by design, it is the seat of what is termed "the puffy tumor;" a swelling of greater or less extent, caused partly by accumulation of pus between the necrosed bone and its pericranium, partly by change of structure in the soft parts exteriorly, which are involved more or less in the extending inflammatory process, and are consequently the seat of effusion and exudation. Indeed, this "puffy tumor," though a valuable and peculiar sign of the internal evil, is not to be regarded as of a special nature; being only the ordinary product of ripe inflammation; œdema by serum externally, infiltration by fibrinous exudation more deeply, and accumulated pus overlaying the bone.

Fig. 6



Plan, illustrative of abscess of the dura mater. *a*, the cranium; *b*, a suppurated space left by detachment of the dura mater; *c*, ditto, by elevation of the pericranium: *b* and *c* constitute the central space of true inflammation; *d*, the arc of active congestion; *e*, that of simple excitement; *c*, *d*, *e*, constituting Pott's puffy tumor.

These symptoms, local and constitutional, occurring together, denote interior suppuration at the injured part. The local signs "following a smart blow on the head, and attended with languor, pain, restlessness, watching, quick pulse, headache, and slight irregular shiverings, do almost infallibly indicate an inflamed dura mater, and pus either forming or formed between it and the cranium."[1]

Treatment.—The general principles applicable to the treatment of abscess must be carried out, if possible. The pus must be evacuated externally; and that at as early a period as possible; as soon as we are satisfied, by conjunction of the local and constitutional signs, that matter has formed. The local symptoms alone are not a sufficient warrant for operative interference; neither are the constitutional; but, when they come together in a marked and plain form, the surgeon is culpably negligent who withholds the trephine. By this instrument—chosen of a large size, to make the probability all the greater of disclosing the suppurated part—the dead portion of bone is perforated; and then the abscess is discharged externally, with immediate relief to the symptoms of compression. Be it remembered, however, that those of inflammation still remain, perhaps aggravated by the addition which the injury of the operation has occasioned. Antiphlogistics must still be continued; and much careful management is required, even in the most favorable cases, ere the patient is conducted to safe completion of the cure. It may happen that the inflammation is not checked; but, spreading both widely and in depth, proves ultimately fatal. In short, while it is obvious that the only chance of the patient's safety is by artificial evacuation of the matter, it is equally plain that the operation alone will not suffice, but must be followed up by the most careful general treatment.

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[1] Pott, vol. i, p. 41.

It has happened that the abscess, burrowing between the dura mater and the bone, has eventually reached the internal ear, and discharged itself externally by the meatus; the patient recovering. But, obviously, such an occurrence is a rare exception to a general rule, and cannot be trusted to in practice.

If, on removing a portion of skull by the trephine, matter is not found, a question arises whether our efforts at direct relief are to cease, or whether further exploration is to be attempted. Is the dura mater to be perforated, in the hope that the site of abscess may prove to be beneath? Not, if the membrane present its usual normal characters at the part exposed; level, moving synchronously with the cerebral mass, smooth, of a brownish hue, and showing something of a silvery lustre. But if it be protruding through the cranial aperture, flocculent, non-pulsating, and either too dark or too pale in color—and more especially, if it afford anything of a feeling of fluctuation when touched—we need not hesitate to puncture, and need not doubt to find an issue of purulent or other fluid from the wound. If the dura mater appear sound, and its puncture consequently be unwarrantable, are we permitted to reapply the trephine; either at the site of *contrecoup*, or in the immediate vicinity of the first application? Either of these procedures may be warrantable, if the symptoms of dura-matral abscess are peculiarly marked, and the surgeon is thoroughly convinced of its existence. But, as can readily be understood, the latter site of reapplication is the preferable. And, as already stated, a large size of trephine should be employed at first, to anticipate the necessity of such repetition. Only in very extreme cases, should the site of *contrecoup* be trephined. Having failed in the indicated spot, we proceed to other explorations with great uncertainty. Fortunately, however, it is comparatively seldom that the site of abscess is elsewhere than at the injured part.

But, if the case be under our cognizance from the first, we have a higher aim than the mere exercise of our art by operation; seeking to prevent the formation of abscess, not to attempt its cure. The patient who has sustained an injury of the head, of any severity, is carefully watched throughout the whole period of convalescence; and the first symptoms of inflammatory accession within the cranium are met by active and sustained antiphlogistics—more especially bloodletting, quietude, avoidance of all stimuli of both part and system, low diet, purgatives, and perhaps calomel; assisted, if need be, after a time by counter-irritation.

When suppuration has taken place either in the substance of the brain or on its surface, the case is obviously not amenable to direct surgical interference, and may scarcely fail to prove fatal. Cure is beyond our reach; but prevention was not. And the latter indication should sufficiently occupy our regard in the previous treatment of the injury.

When a severe scalp wound has been sustained, with bruising or fissure of the bone, it is not uncommon for the character of the wound to degenerate as in the case of dura-matral abscess, with some constitutional disturbance of an unpleasant character. But neither the meningitic symptoms, nor those of compression, appear. Suppuration has taken place in the diploë. If fissure exist—perhaps extending only through the external table—pus will be found slowly oozing outwards. Enlargement of the chink is necessary, however, for more free evacuation. If there have been no previous solution of continuity, the trephine may be used for removal of a portion of the external table.

The mischief may extend inwardly, and dura-matral abscess form, as previously stated; but, fortunately, such is by no means the invariable result; and is indeed little likely to take place, if suitable treatment have been adopted.

If phlebitis occur in the diploë, the case becomes eminently serious; partly on account of the direct effects of this disease; but mainly from the risk of pyæmia (*Principles*, 4th Am. Ed. p. 204).

After injuries of the head, abscess of the liver is by no means uncommon; and it is probable that at least many of these cases are connected with unhealthy suppuration, with phlebitis, in the diploë.

Fractures of the Cranium.

In the child, much violence may be sustained by the cranium with impunity. The osseous tissue is then elastic; it yields to the force, and is temporarily depressed, but without solution of its continuity; and, after a time, the depression is gradually effaced by a vital resilience, independent of external aid. In the adult, and more especially the aged, the bone is of a much more brittle nature; and less force succeeds in effecting solution of continuity, more or less extensive.

The skull may be merely fissured; or the injured part is broken into fragments, implicating the whole thickness of the bone, with or without depression of these; or the external table alone is broken; or the internal table exclusively suffers; or both are penetrated by a sharp-pointed weapon, the internal sustaining the greater amount of injury. The fracture may be at any part of the periphery of the cranium, or may traverse its base; and further, it may be either simple or compound.

The dangers attendant on the injury are various. 1. By concussion. 2. By extravasation of blood within the cranium. 3. By excessive escape of blood externally from the wound. 4. By displacement of the fractured portions inwards, causing compression. 5. By inflammation, occurring in either the brain or its membranes.

The treatment will comprise various indications calculated to oppose these several results.

Fractures of the cranium, whether simple or compound, unite only by definitive callus (*Principles*, 4th Am. Ed. p. 618). Want of provisional callus, doubtless, may delay completion of the healing process; but all incommoding of the brain or its membranes, by osseous bulging, is avoided —which otherwise could not fail to occur.

Fissure.

Capillary solution of continuity is, in itself, a thing of but little importance. But the shock which has caused it may well occupy our attentive regard. The fissure itself, indeed, may in its formation have proved an actual advantage; rendering the concussion less intense and less hazardous than it might have been, had the ringing calvarium remained entire.

The fissure may be short, and bounded by suture; or it may traverse several of these, and be of great extent. It may take place at the part struck, or at the site of the *contrecoup*. It may be conjoined, or not, with rupture of the dura mater at the fissured part; and if it be so conjoined, compression by extravasation is likely to ensue. When the injury is situate at the base of the cranium, it is usually associated with such rupture; and extravasation occurring at this site, even to a slight extent, we have already seen to be of the gravest import.

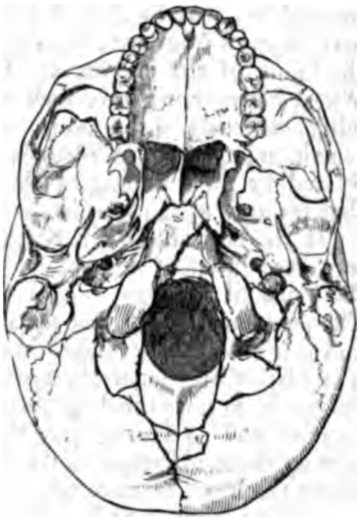
The symptoms attendant on fissure are usually those of concussion, in the first instance; and these may be followed by those of compression by extravasation. Inflammatory accession is not unlikely; giving the ordinary train of symptoms, varying according to the part and texture involved. And these, again, may be merged in the symptoms of compression by suppuration. If the injury be compound, the existence of fissure is ascertained by the finger or probe. If it be simple, the fissure may very probably elude detection; the case being treated as one of simple concussion.

Long ago, it was the custom, in the treatment of this injury, to expose the fissure throughout its whole extent, by incision; and to apply the trephine repeatedly in its course; probably in the hope of liberating extravasated blood. But no one now thinks of thus aggravating what is in itself comparatively simple. It is time enough to take up the trephine, when symptoms of compression, by blood or by pus, are so plain and so urgent as to demand its use. It is not often, as already explained, that on the first count we are called upon to operate; and, if we have seen the case from the first, it may be our own fault if we have to interfere on account of the untoward result of inflammation. The treatment is chiefly expectant. We await reaction from the effects of concussion; watch the period when extravasation is likely to occur; and, if need be, then interfere—repressingly. That period of danger having passed, we are again quiescent, though alert; looking out for symptoms of inflammatory accession; and ready to oppose these with energy, should they appear.

Fissure at the Base of the Cranium.

Solution of continuity, in this situation, is usually a fissure; disruption, more or less extensive, without comminution or displacement. The fissure may either extend through previously compact bone; or be a kind of diastasis—separation of the sphenoid from the temporal bones, for example, at the original points of union. As already stated, it is generally accompanied with laceration of the dura mater, and internal hemorrhage; and consequently is invariably attended with the greatest danger to life. The important parts of the brain implicated are almost certain to be compromised in function, sooner or later; either almost immediately by extravasation; or by inflammation at a more remote period.

Fig. 7.



Fissure at the base of the skull, involving the occipital and sphenoid bones. The patient fell from a ladder on the vertex, and lay comatose for some days before death. Extensive extravasation was found over the cerebellum and middle lobes of the brain.—Liston.

The injury may be occasioned in various ways. The head may be crushed laterally; as by being jammed between a wheel and a wall or post. Or, while the body is at rest, a severe blow is received on the vertex; and the strain of the shock, communicated through the temporal bones, produces a splitting of these, or tears open the connections with the sphenoid.[1] Or the body, falling, alights on the vertex; and the spinal column, carrying both the weight and momentum of the body, is driven down upon the cranial base—the basilar process being probably broken through. Or, falling from a height, the patient alights on his breech, or on his heels; and, again, a concussion sufficient for disruption may be so communicated to the cranial base. The extravasation is not always slight; it may be great, one or more of the large venous sinuses having been torn; then the symptoms are from the first most grave, and cannot but end fatally and soon.

The circumstances which lead to a suspicion of fracture at the base of the skull are: The kind of injury inflicted, such as already described; symptoms of compression, early and severe; escape of blood from the ears, nose, mouth; ecchymosis of the eyelids and ocular conjunctiva;[2] and discharge of a watery fluid from the ear, sometimes in considerable abundance. The last symptom—often termed "welling of the ear"—is not immediate, but occurs after some days have elapsed. By some it is considered to denote escape of serous fluid from the sac of the arachnoid; others, contending that the phenomenon has been known to occur when certainly that sac was not opened into, believe that the fluid is but the serum of extravasated blood, trickling through the fissure; by all it is held as a sign of most untoward import.[1] Bleeding from the nose, mouth, or ear, following on severe injury of the head, is always suspicious; more especially if the patient be found in a state of insensibility. But let it be borne in mind that such a combination of circumstances by no means certainly denotes the existence of fracture at the base; the insensibility may be that of concussion or of intoxication; the bleeding may proceed from mere laceration of the schneiderian membrane and of the lining of the meatus, and from injury of the tongue by the teeth. When, however, we have such bleedings accompanied by urgent insensibility, obviously of the nature of coma; when the head symptoms either remain unimproved, or advance untowardly; and, more especially, when by and by the "welling of the ear" appears—we may safely conclude that fracture at the base has occurred.

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[1] "If a force be applied to the vertex, the superior border of the parietal bones resist displacement downwards, inasmuch as their inferior borders cannot be thrown outwards in consequence of their being supported laterally by the overlapping of the squamous portions of the temporal bones; while the temporal bones, as M. Malgaigne has pointed out, are themselves supported by the zygoma, which constitutes on each side a true buttress, sustained by the superior maxillary bone. A shock, then, applied to the vertex, is directly transmitted to the temporal bone, and propagated through its petrous portions to the posterior part of the body of the sphenoid bone, the parts which most fractures of the base of the cranium traverse"—Brit. and For. Med. Rev. No. 29, p. 174.

[2] The orbital plates having been broken too, and blood infiltrating forwards into the loose areolar tissue.

[In the last edition Dr. Sargent reminds us that another sign of fracture at the base of the cranium is *ecchymosis* beneath the conjunctiva of the globe of the eye and of the eyelids, particularly of the inferior. The manner in which this phenomenon is produced is obvious enough, and it is evidently an indication of value, as maintained by M. Velpeau. Fracture of the bones concerned in the formation of the orbit, must be ordinarily accompanied by sanguineous extravasation from rupture of vessels; and as the cellular tissue surrounding the eyeball, and connecting the conjunctiva to the sclerotic, is loose and yielding, it readily allows the blood to insinuate itself into its texture, and even, perhaps, to separate it more or less from its connections, until the fluid shows itself anteriorly upon the globe and beneath the integuments of the lid. In order, however, that this sign shall possess any exclusive value as indicating fracture within the cranium, it must be unaccompanied by external evidences of violence received upon or near the eye, as this cause might of itself occasion the ecchymosis in question without any internal lesion.]

The treatment must plainly be prophylactic and expectant, as already advised in the case of compression by inaccessible extravasation. There is no room for direct operative interference. If the compression be happily got over, we must then be very watchful of inflammatory accession. In all cases, prognosis is unfavorable; the majority prove fatal—either immediately by coma from extravasation, or more remotely from the effects of inflammation.

But it must be remembered, that fissure of the cranial base may occur without any characteristic symptoms being evinced; the patient seeming to labor under mere concussion. The fissure may have been slight; and the solution of continuity may have been confined to the bone alone. The membranes remain entire; and there is no inward escape of blood. Compression, by extravasation, necessarily does not supervene; and inflammatory danger may be warded off by ordinary care. Such cases, however, are of comparatively rare occurrence.

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[1] Laugier, Archives Generales, Aout, 1845; also, Brit. and For. Med. Chir. Rev April, 1850, p. 342; Ranking's Retrospect, vol. ii, p. 100; Lancet, No. 1558, p. 24.—Hilton.

Fracture without Displacement.

The most common solution of continuity in the cranium is not a mere fissure; but a fracture, analogous to comminuted fracture of the long bones; reducing the injured part to the condition of being broken up into one or more fragments; and these may or may not be displaced. When there is no displacement, the dangers to be apprehended are such as are common to other injuries of the head, apparently less severe; concussion; excessive reaction, bringing compression either by extravasation or by untoward inflammation: or a more insidious inflammatory process, occurring at a more remote period. The fracture may be simple, or compound, or with wound (*Principles*, 4th Am. Ed. p. 611). The compound is necessarily of a more unfavorable character than the others; danger by inflammation being greater and more probable. But the difference is, on the whole, not so marked as between corresponding injuries of the bones of the extremities. It is possible that the existence of a communicating wound may prove even an advantage; by permitting outward escape of inflammatory or other effusions, and so saving the important internal parts.

The treatment is prophylactic and expectant: according to the general principles already explained. There is as little necessity for immediate trephining, as in the case of mere fissure. If the injury have been sustained at the lower and anterior angle of the parietal bone, and is speedily followed by urgent compression, it may be advisable to apply the trephine in order to afford a freer vent for the meningeal hemorrhage, But, usually, the aperture already existing is sufficient for an outward drain. And again, should symptoms of compression by suppuration supervene, at a more advanced period, operative interference may be necessary to effect a free evacuation. In general, however, there is no necessity for the use of the trephine.

Fracture with Displacement.

If the fractured portion, or portions, be displaced inwards, the brain is more or less incommoded, and symptoms of compression ensue; proportioned usually to the amount of depression, and to the relative importance of that part of the brain which is injured. The upper and anterior surface of the brain, as formerly stated, may bear a very considerable amount of compression with comparative impunity.

The injury may occur without corresponding wound of the soft parts; but usually the fracture is compound.

The dangers are formidable. 1. By concussion. 2. By extravasation of blood. 3. By the results of inflammation on the brain and its membranes. 4. By compression, caused by the displacement.

The three first are to be opposed by fulfilment of the ordinary indications. The last is to be removed by operative interference. But in regard to this the question at once arises:—Whether, in all cases of depressed fracture, operative interference, for the purpose of replacing the depressed portion of bone, is necessarily demanded? Formerly, the answer was in the affirmative; at present, it is not so. Elevation of the depressed portion is had recourse to, with two remedial objects in view: to remove the cause of compression, and consequently the symptoms of this, when they exist; and also to remove a likely exciting cause of inflammation from the portion of cerebral tissue and membranes acted upon by the depressed bone. When the symptoms of compression are great and urgent, there is no room for hesitation; it is plainly the duty of the surgeon at once to attempt removal of the cause; and fulfilment of the former of the two indications is sufficient warrant for recourse to the operation. But if symptoms of compression either do not exist, or are slight, and are recedent rather than gravescent, the case is very different. If we operate then, it is only to fulfil the latter indication: removal of the exciting cause of an apprehended inflammatory process. And then this other question arises:—Whether the continued pressure of a smooth portion of depressed bone, or the injury inflicted by performance of the operation, is the more likely to excite an untoward amount of this? Experience has answered to the effect, that the greater risk is encountered by recourse to operation.[1] And, consequently, the rule is, to refrain from operation in all cases of ordinary depressed fracture, in which symptoms of compression do not exist. Further: we know that the brain has the power of slowly recovering under a certain amount of pressure, even when that pressure continues undiminished. And, consequently, the rule of non-interference is extended also to those cases in which the symptoms of compression exist, but are by no means urgent, and seem to be slowly receding rather than on the increase. In young subjects, the call for artificial elevation must be especially urgent before it can with propriety be obeyed. For in them, it is to be remembered, a system of *mutual accommodation* may be said to be in progress; the brain not only becoming accustomed to its altered circumstances, but the compressing agent being also gradually withdrawn—the bone, by its inherent elasticity, slowly re-approaching its former level. In the adult, there is not the same resiliency; but then too something is done, on the part of the bone, to favor complete recovery of the functions of the incommoded organ. For after some considerable time, the depressed portion is found to have become wonderfully smooth on its internal surface, and bevelled at its margins, by absorption; not ceasing to press, but now pressing with all gentleness on the parts beneath.

In ordinary fracture with displacement, therefore, we do not interfere by operation, unless symptoms of compression not only exist, but are urgent. And in these cases the operation may not wholly succeed; the compression being perhaps by blood as well as by bone. In all other cases, we content ourselves with the expectant and prophylactic treatment, as if depression did not exist.

When the fracture is compound, comminuted, and depressed—that is, when fragments are not only displaced, but completely detached from the rest of the cranium—we of course do not hesitate, in all such cases, to remove the loose fragments, with gentleness and care, whether symptoms of compression exist or not.

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[1] Abundance of cases are on record, testifying the power which the brain has in bearing long-continued pressure, with comparative impunity, so far as inflammatory accession is concerned. One very remarkable instance is related by Sir A. Cooper (Lectures, p. 128), in which certain symptoms of compression endured for upwards of thirteen months, in consequence of the existence of depressed fracture; complete and almost instant recovery following removal of the depression by operation at the end of that period.

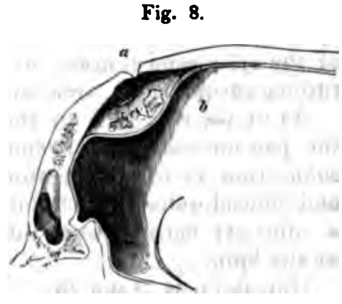
Also, let it be understood, that when, in a case of compound fracture, with displacement, sharp fragments seem to be dangerously in contact with the dura mater—much more, if this membrane be penetrated or punctured by them—we ought as soon as possible to raise or remove the offending portions, whether head symptoms exist or not; for in no other way can violent inflammatory accession be averted.

When operative interference is determined on, the indications to be fulfilled are sufficiently plain. To expose the parts, by suitable incision of the soft textures superimposed. To use the sound margin of bone as a fulcrum, on which the elevating lever may rest. To insinuate the extremity of the lever beneath the displaced part, and to effect replacement with as little violence as possible. For the insertion and working of the elevator, sufficient space may already exist. If not, this is to be acquired; by gentle lifting away a loose fragment; or by removing a portion of the sound bone, by means either of the saw or of the trephine. After the operation, much antiphlogistic care must necessarily be maintained.

Punctured Fracture.

By the term "ordinary fracture, with or without displacement," is meant injury done by an obtuse body; causing solution of continuity throughout the whole thickness of the bone; and producing fragments composed of both tables of the skull, separated from their general connection in nearly equal proportions. A smooth, uniform, non-penetrating, surface is consequently presented by the depressed portion to the brain and its membranes. But when a sharp-pointed substance—as the point of a poker or pitchfork, the corner of a spade, shovel, or hammer, or the angle of a sharp stone—impinges on and penetrates the cranium, the nature of the injury is very different. The external table is crushed by the penetrating body, to an extent proportionate to its lodgment.

Fig. 8.



Punctured fracture, at *a*; at *b*, the dura mater represented detached, and spicula of bone lodged in the vacant space.

But the inner table, being much more brittle, gives way to a greater extent. It is broken up into fragments—usually small and spiculated—which, being driven inwards by the force of the blow, penetrate, or at least seriously irritate the coverings of the brain, producing inflammation. This may be general, involving the brain itself, and to the last degree dangerous; or it may be limited to the injured dura mater, causing abscess there—a result still most perilous to life. And to accomplish the latter evil, it is not necessary that the fragments of the inner table should pentrate, or in any way mechanically injure the dura mater. It is sufficient that they are detached from the general cranium, and remain unremoved; then they necessarily die; and, as sequestra, they inevitably become surrounded by purulent formation.

The rule of practice, then, comes to be plain. Whenever we are satisfied that punctured fracture has occurred—in other words, that the kind of fracture is such that splintering of the internal table is certain—we cannot too soon proceed to operation. We trephine immediately, so as to expose the fragments, and admit of their being carefully and efficiently removed. Unless they are taken away, antiphlogistics are practised in vain; inflammation becomes established at the part; sooner or later abscess forms; and then we find ourselves compelled to operate for relief of compressed brain, under very unfavorable circumstances. The least result is abscess of the dura mater; but it may be, that even the questionable chance by operation is not afforded, the inflammation having proved general—cerebral, as well as meningitic—and speedily carrying off the patient. Taking the most hopeful view of the case, a necessity for operation is certain to arise, at some stage. And surely it is most prudent to operate at that time which plainly is most promising of an auspicious result. Better to operate at once, removing the paramount exciting cause of the inflammatory process, and probably averting all casualties; than to attempt, subsequently, to retrieve or limit danger and disaster, already sustained.

The rule as to operation, then, is very different in the case of punctured fracture, from what is applicable to any other injury, hitherto considered. We at once proceed to the operation of trephining, whether head symptoms are present or not. The mere existence of this form of injury is an amply sufficient warrant for our interference. Head symptoms, and those of a most urgent kind, are certain to supervene, if the operation be withheld; and they can be averted only by early removal of the splintered fragments resting on the dura mater. After the operation, antiphlogistic treatment must be sedulously maintained.

As in the case of concussion, it may be difficult, at first, to persuade the patient—as yet suffering but little—of the propriety of instantly submitting to treatment which may seem to him unnecessarily severe, and indeed quite unwarrantable. This obstacle is to be overcome, by a calm yet earnest exposition of the certain danger which otherwise awaits him.

Obviously, it is our first duty to come to a just conclusion as to the existence or not of this kind of fracture. A most minute examination is accordingly made. The scalp is freely divided, if need be, to expose the fractured point to sight as well as touch; and by a gentle yet determined use of the finger and probe, we endeavor to satisfy ourselves thoroughly; assisted in our decision by regard to the mode in which the injury has been inflicted.

Penetrating Cuts of the Cranium—as by a sabre, axe, or sharp spade,—often closely resemble punctured fracture, as to the kind of injury done to the inner table, and the immediate necessity for operation. When the cut passes sheer through both tables, the inner one is usually splintered; and the fragments press inwards, untowardly. They must be removed. The chasm of the wound is often sufficient to disclose their presence and site, to finger or probe; and it may suffice for removal also.

If not, room is to be made by application of the trephine, or saw, as may seem most convenient.

Fracture of the External Table, alone.

This is not an uncommon result of comparatively slight violence done to the calvarium; by bodies either sharp or obtuse. The external table alone gives way; and is perhaps driven inwards on the diploë. The most marked sample of the injury is afforded by fracture over the frontal sinus; in other parts of the calvarium the accident occurs only in those of middle age, who possess diploë, with marked distinction between the cranial plates. No operative interference is required; except in the case of the frontal sinus; and then elevation of the depressed part is expedient. The treatment is, locally and generally, antiphlogistic. But, as formerly stated, the inflammatory process may become excessive, and extend inwards; and suppuration in the diploë may lead to suppuration also on the internal aspect of the bone, necrosis of the implicated part ensuing. Under such circumstances, the operation of trephining is likely to be required, to relieve compression. Sometimes diploal phlebitis, with its sad consequences, ensues; too often baffling all treatment.

Fracture of the Inner Table, alone.

Fortunately this is of comparatively rare occurrence; for, the outer table remaining entire, we have no means of ascertaining the nature of the injury, at the time of infliction. It may follow on a sharp concussing blow; in a patient, who, by reason of age or other cause, has a vitreous table of unusual brittleness. The table may be simply severed, and not much depressed; then head symptoms are likely to prove both slight and transient. But, more probably, there is comminution as well as displacement; and then the usual hazard is incurred from the depressed and perhaps penetrating spicula. The trephine is likely to be called for, after a time, on account of dura-matral abscess.

Depression without Fracture.

As already stated, this occurs only in children; in whom bones are more prone to bend than to break. A dimple is made in the skull by external violence, and is slowly effaced by virtue of the inherent elasticity of the tissue. For a time, there may be symptoms of compression; but seldom of a marked character; and still more rarely urgent. Operative interference is neither necessary nor expedient. The treatment is simply antiphlogistic; and prophylaxis is long maintained.

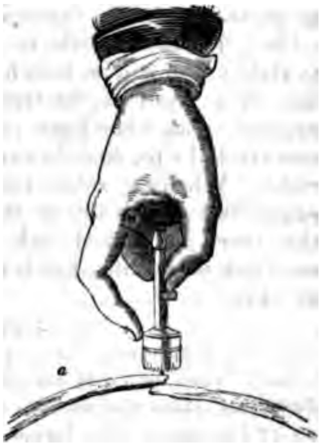
The Operation of Trephining.

The trephine is a circular saw, worked by a light and rapid movement of the hand, whereby a portion of the skull is divided, and may be removed. For its application, complete exposure of the bone is necessary. If a wound already exist, it is enlarged to the necessary extent. If there be no previous wound, a crucial or other incision is made; so that, by reflection of flaps, the required exposure may be effected. The pericranium is carefully raised to an extent sufficient to admit of the free play of the instrument; but no farther. The centre-pin, sharp-pointed, having been made to protrude a short way beyond the serrated edge, is securely fixed there by its screw. And then, by firm pressure, accompanied with a slight rotatory motion, the centre-pin is fixed in the bone, so as to steady the instrument in its first movements on the external table. The teeth of the trephine are usually set so as to work from left to right; and it is well to have the crown fluted on its lower half—this being found to favor its free play. The turnings are made steadily and rapidly; with very light pressure, after the centre-pin has been fixed; and the light pressure is exerted only during the movement from left to right. When the sulcus has advanced to such a depth as is sufficient to retain the saw steady in the groove, the instrument is withdrawn, and the centre-pin pushed back entirely; to proceed with it still protruding, were not only to do what is unnecessary, but also to encounter much risk of injury to the dura mater at the latter part of the operation. The plain crown is reapplied, and worked steadily as before. There is no occasion for hurry; the operation itself, so far as the sawing of the bone is concerned, is comparatively painless; besides, it is usually undertaken while the patient is insensible; and in those cases where sensibility remains, experience has shown that anæsthesia by chloroform may be practised with perfect safety. If diploë exist, a change of sound and feeling is imparted to the operator, intimating that the saw has passed the external table. Then the instrument is worked very warily; and it is well to remove it from time to time, examining the sulcus with a probe or toothpick, to ascertain whether or not at any point section of the inner table may have been completed. If an aperture be detected, then the instrument, when reapplied, is inclined to the opposite side, and moved with increased caution and lightness. Want of parallelism in the two tables of the skull renders such precautions essential to a safe performance of the operation. Section having been completed at all points, the detached circle is to be removed. Perhaps it may come away in the crown of the instrument. If not, dislodgment is effected by the point of a lever, or by forceps; and the circle is gently withdrawn:—in this step of the procedure, as well as in the last of the sawing, much care being taken to avoid injury to the dura mater. If any rough or sharp points are found on the margins of the aperture, these are to be removed by the elevator; otherwise, the dura mater might sustain injury.

When the operation is undertaken for elevation of depressed bone, it is seldom necessary to remove an entire circle. All that we desire is room sufficient for raising the depressed portion, and removing fragments if need be; and this can usually be accomplished by fixing the centre-pin on the brink of the sound bone, and so removing by the saw only a segment of the circle.

The operation, and the object for which it was undertaken, having been accomplished, the flaps are carefully replaced, and the general wound is invested by tepid water-dressing; care being taken that no undue bleeding takes place from the scalp; and in regard to this point, it is to be remembered that vessels which do not bleed during the state of depression, may part with their contents freely on the establishment of reaction. Above the water-dressing it is well to place a few turns of a bandage lightly applied, so as to afford support; and this is more especially necessary when deficiency of the cranium happens to be considerable. The wound, in other respects, is treated in the ordinary way; union taking place by the second intention. Of course, rest is absolute, severity of regimen is extreme, and antiphlogistics are held in readiness, for some considerable time after the operation. It has been proposed to replace the removed circle of bone, after completion of our object, in the hope of its becoming reunited; but such hope has been proved vain, as might have been expected.

Fig. 9.



Trephining. *a*, the sound portion of cranium; *b*, the depressed. The centre-pin fastened on the brink of the sound portion.

When the wound has healed, the dura mater is found to have become incorporated with the soft parts exteriorly, and the breach in the cranium is not filled up by bone, but by dense membranous formation. A meagre film of new bone may be found at the mere margin of the aperture. And this, in time, extends centripetally; apparently by the slow secretive action of the parent bone alone, the pericranium, dura mater, and other soft parts, seeming to be incapable of ossific action. At the margin of the aperture the new bone may be of similar thickness with the cranium; but as it extends, it shelves rapidly; becoming very thin as it approaches the centre. Many years are required, ere osseous reparation is complete. And in consequence, it is expedient for a long time to guard the imperfect part from external injury; a piece of leather or metal being worn over the cicatrix.

At one time, trephining was frequently performed; and on grounds much too slight. From the preceding remarks, the following brief deductions may be drawn, as to its present use. It is had recourse to, 1. On account of punctured fracture, as soon as possible; whether head symptoms exist or not; the object being to remove splintered fragments of the inner table. 2. On account of depressed fracture, accompanied with urgent symptoms of compression; when elevation of the depressed portion cannot otherwise be effected. 3. On account of dura-matral abscess, when local and constitutional symptoms sufficiently concur in pointing out the existence and site of this morbid condition; the object being to effect external evacuation of the pus. 4. On account of urgent compression caused by extravasated blood; only when the circumstances are such as to indicate the seat of extravasation, and when that happens to be accessible.

Occasionally the surgeon has been called upon to trephine, in cases of epilepsy, in which the disease seemed to be connected—in the relation of effect and cause—with a depression of the cranium, the result of former injury; or in which circumstances seemed to point with much plainness to a certain spot of the cranium—perhaps the seat of internal enlargement of either a globose or spiculated character. The operation, under such circumstances, is of doubtful expediency; but may be performed, at the suspected spot, in obedience to the urgent entreaty of the patient or his friends.

Trephining has also proved successful on account of neuralgia dependent on inward growth from the cranium.[1]

In general, it is well to avoid applying the trephine in the direct course of the middle meningeal artery, or over the longitudinal sinus. Yet if it seem of decided importance that the instrument should be applied at such localities, the risk of hemorrhage need not deter us. A compress of lint, directly and accurately applied, will readily restrain the venous bleeding (*Principles*, 4th Am. Ed. p. 323); and if a similar application fail to stanch the arterial flow, the osseous canal, in which the vessel is usually imbedded, may be temporarily plugged, by the insertion of a small portion of wood or cork (*Principles*, 4th Am. Ed. p. 314).

Wounds of the Brain.

The brain may sustain an incised wound, as by a sabre cut; a contused and lacerated wound, as by depressed fracture; a punctured wound, as by the thrust of a bayonet, pike, or any other sharp-pointed weapon; or a gunshot wound—of the class "contused and lacerated,"—by the penetration of a bullet. The likelihood of disaster is grave and imminent; by extravasation of blood, in the first instance; by inflammation and its results secondarily. Treatment requires to be proportionally watchful and energetic.

[According to Erichsen (Am. Ed. p. 283), laceration of the brain, occurring either under the seat of injury, or more frequently at a distant or opposite point, by a kind of contre-coup, is a not unfrequent accompaniment of undepressed fracture of the skull, and even of simple concussion of the head without fracture. He has found this *laceration of the brain by contre-coup*, to be one of the commonest causes of death in simple fracture of the skull. The experience of our own hospitals would seem to accord with the observation of Mr. Erichsen.]

Incised wounds may simply penetrate, or partially detach a slice of the organ. Such a flap is not to be at once removed; but should be replaced, along with the corresponding investing textures, in the hope that reunion may occur. Examples are not wanting of a fortunate result.[2]

In contused and lacerated wounds, a certain amount of inflammation is inevitable. It is our business to moderate and control this, by the ordinary means; so preventing disórganization and protrusion of the cerebral tissue at the injured part.

In punctured wounds, inflammation is not inevitable—unless foreign matter lodge—yet it is very likely to occur. The antiphlogistic precautions require to be very rigid.

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[1] Boston Med. and Surg. Journal, August, 1846, p. 53.

[2] Larrey, Clinique Chirurgicale, tom. i, p. 140.

In gunshot wounds, danger by inflammation is pre-eminently great. Not only is the wound of the contused and lacerated kind; there is also great probability of lodgment of the bullet, or portions of it, or of fragments of bone which have been displaced and driven in. And it is well to remember, that the want of an apparently sufficient aperture of entrance is no sure proof of the ball having not penetrated and lodged; for, in the young more especially, the inherent elasticity of the osseous tissue may be so great as to diminish the space of entrance-wound very considerably. Contusion and laceration of the cerebral tissue, and its investments, render a certain amount of inflammation inevitable; and the lodgment of foreign matter determines the amount and intensity of this to be great and hazardous. Further; foreign substances, penetrating deeply, are not unlikely to interfere with the most important portions of the organ—at its lower and posterior part—producing death, either instantly, or at no protracted period, by direct interference with function.

Lodgment of Foreign Bodies.

When foreign bodies penetrate the brain, and their site of lodgment can be ascertained through the wound, the surgeon naturally becomes desirous of effecting removal of so palpable an exciting cause of the coming inflammatory process—the results of which he so much dreads, and not without good cause. If extraction can be effected easily, by forceps, probe, or hook, without much additional injury being inflicted on the cerebral tissue, it should certainly be attempted with as little delay as possible. If, however, the site of lodgment is unknown, or if the foreign body, of no great size, is found both difficult of access and firmly imbedded, it is better to abstain from the infliction of exploratory and evulsive violence; which would be certain to kindle an amount of inflammation quite uncontrollable. It is better to withhold all direct interference; contenting ourselves with busy antiphlogistics, to meet that amount of the inflammatory process—perhaps amenable to control—which the infliction of the wound and the lodgment of foreign matter cannot fail to induce. We may happily succeed; though the general prognosis is doubtless unfavorable. There are instances on record of bullets, lodged deeply in the brain, remaining there harmless for years; incased in adventitious cysts—as happens in other textures (*Principles*, 4th Am. Ed. p. 590). Such fortunate patients, however, require ever to be most careful in avoiding all inordinate excitement of the cerebral functions, and of the general circulation; for it has happened, again and again, that—after years of immunity—a debauch or violent emotion has induced a sudden and fatal coma.

The rule of practice then is: That, while it is very desirable, at as early a period as possible, to remove foreign substances which have lodged in the brain, in order that we may hope to contend more successfully with the coming inflammation—such removal is not to be attempted at the expense of further and serious injury to the cerebral tissue. Such additional injury will render the inflammatory process uncontrollable; and the patient must perish thereby. Leave the part undisturbed, and trust to general antiphlogistics; for it is possible that the inflammatory process may be kept within moderate limits, and the patient saved. Sometimes they make wonderful escapes, as in the instance of recovery after an iron bar had completely traversed a large portion of the brain.[1]

Hernia Cerebri.

By this term is meant protrusion of the cerebral substance through cranial deficiency. To constitute this morbid state, three things usually conspire: deficient space in the cranium; a corresponding aperture in the membranes of the brain, by wound, ulceration, or sloughing; and disorganization of the corresponding portion of cerebral substance by inflammation. It is most likely to follow on compound and comminuted fractures of the skull, with depression of the fragments, and laceration of both brain and membranes. The pouting prominence of brain at first merely fills the cranial orifice; it then shoots above it; and, in no long time, it may attain to a considerable size. Now, probably, its neck becomes impacted in the cranial aperture, is strangulated there, and sloughs; a fresh protrusion, however, takes place, and the progress is as before. Portion after portion of the upper part of the brain may be lost in this manner, without apparent and direct injury to the cerebral functions;[2] but, sooner or later, the formidable constitutional irritation which accompanies will prove fatal; and there is besides, a risk of the disorganizing inflammation extending widely and fatally from the original site.

Prevention may be in our power. When the brain has been exposed by compound and comminuted fracture; and when there is a deficiency of the cranium, by removal of the fragments, with or without use of the trephine—the occurrence of cerebral protrusion, in consequence of inflammatory accession, is always to be apprehended. And two indications fall to be fulfilled. 1. To atone for the cranial deficiency, by affording uniform, steady, yet gentle support to the part, by compress and bandage; renewing the dressing as often as cleanliness and propriety of management require. 2. By antiphlogistics, timeous and efficient, to prevent or control the otherwise disorganizing inflammation.

An attempt to *cure* comprises greater difficulty. The obvious indications are, to restrain the inflammatory process; and to repress the exuberant growth. The former is to be fulfilled by antiphlogistic treatment; but this must be most warily conducted, inasmuch as by this time there is no tolerance in the system of severe remedies of that character. To fulfil the second, three means may be considered effectual: pressure, ablation, escharotics. Pressure is to be preferred; direct, accurate, steady, firm, but not severe—otherwise symptoms of compressed brain might be induced, with, not improbably, aggravation of the inflammatory risk. The hydrostatic pressure, as recommended by Dr. Arnott, may be found highly available. Ablation of the cerebral protrusion is not expedient, unless the protruded part be in a sloughy condition, and must ultimately be lost; or unless pressure, alone, have been duly tried, and found ineffectual. In either case, the protruding portion may be shaved smoothly off, by a knife, on a level with the cranial aperture; and then restraining pressure is to be resumed. The use of escharotics is, in no case, advisable.

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[1] Bigelow; Brit. and For. Rev., Oct. 1850, p. 543.

[2] It has been supposed that the lost portions of cerebral substance are regenerated by a reparative effort on the part of the brain; and that thus the non-impairment of cerebral function may be accounted for.—Lancet, No. 1399, p. 760.

The true hernia cerebri consists of cerebral substance more or less disorganized; often mixed with grumous blood, and other inflammatory products. Sometimes it contains, or is based on an accumulation of pus, or other inflammatory exudation. Then, puncture of the mass may perhaps be useful, as a means towards alleviation, if not of cure. Its formation is always a most unfavorable sign; and the ultimate issue is seldom but unfortunate. The affection is sometimes simulated, however, by coagulum. A mass of clotted blood, mixed with inflammatory exudation, but containing little or no cerebral substance, may protrude; presenting almost the same appearances as the genuine tumor. This is amenable to more summary treatment, and bespeaks a more hopeful issue—although usually a sign of active inflammation having seized on the part, and calling for a proportionate activity in antiphlogistics. The projection is at once removed, by knife or fingers; and firm occupying pressure is applied to the cranial aperture.

Paracentesis Capitis.

The operation of tapping the brain in chronic hydrocephalus, known to Hippocrates, and practised by the surgeons of the middle ages,[1] enjoys in the present day no great repute. Of modern practitioners, Dr. Conquest has shown the greatest favor to the procedure; and his experience of it has been by far the most favored by success.[2] Of nineteen cases in which the operation was performed, ten were "living when last heard of."[3]

Dr. West has collected, from various sources, fifty-six cases;[4] of which forty died, sixteen only recovering. Of the fatal cases, six died within four days; six within fourteen days; three within one month; nine within three months; only one survived the puncture six months; and none survived the last puncture more than thirty-five days. Death took place either by exhaustion or under cerebral symptoms. In many cases, in addition to the presence of much fluid, the substance of the brain was found softened; and, besides, "there existed in sixteen of the cases serious organic disease, or malformation, of the brain itself."

The serous accumulation usually takes place in the ventricles; and the brain, if not congenitally deficient, is spread out and attenuated, with its convolutions smoothed away; the ventricles ultimately constituting one large cavity covered by a thin layer of cerebral substance, which lies immediately beneath its own membranes. Sometimes, on the other hand—though comparatively rarely—the liquid is immediately within the dura mater; and the brain, which in these cases is usually partially deficient in its commissures, lies at the bottom of the serous cavity.

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[1] Philosoph. Transact. vol. xlvii, Ann. 1751.

[2] Medical Gazette, March, 1838.

[3] In Dr. Conquest's cases, the greatest quantity of fluid drawn off at one time was ℥20½; the largest total quantity ℥57, or ℥58; the greatest number of operations in any one case, five; performed at intervals of from two to six weeks.

[4] Medical Gazette, April 15, 1842.

Remedial means in chronic hydrocephalus consist of purgatives, and mercurials, assisted by gentle and uniform pressure on the head. Failing these, the question arises whether the patient is to be abandoned to his fate, or an attempt made to save him by tapping. Some, acting on the principle "anceps remedium melius quam nullum," operate; the majority decline interference. Statistics, in the aggregate, as we have seen, hold out no flattering prospect of success. At the same time, in an otherwise hopeless case, if the parents, on a fair and full representation of every circumstance having been made to them, are willing and desirous to undertake the risk, there seems to be no insuperable reason against the operation being then performed. One of three events may occur; death may ensue speedily; or matters may be left much as they were, the head refilling; or a cure may be effected. Hoping for the last, the surgeon proceeds thus:—

A small trochar is introduced perpendicularly through the bregma, or in the coronal suture, at a safe distance from the longitudinal sinus and its feeding veins; and it is seldom necessary to penetrate further than about two inches. Withdrawing the trocar, clear serum flows through the canula, and the more gradually it escapes the better; compensating pressure being at the same time made on the head, by the hands of an assistant. Should the pulse become quick, the pupils contract, and the face suddenly change its expression, the flow is stopped for a time. Faintness occurring, the child is laid horizontal, and a few drops of ammonia given in water. Sometimes blood comes through the canula, a sign that a vein has been punctured;[1] sometimes the flow becomes obstructed by a portion of the brain, and the canula requires to be cleared by a probe.

After enough has been drained away, the wound is shut by means of collodion, and the whole head is carefully and uniformly supported by elastic strapping. Should slight cerebral excitement follow, it is well; for success is most probable in such cases; a healthful result being induced by the excitement, as after injection of hydrocele (*Principles*, 4th Am. Ed. p. 173). But in general, mild doses of the hydrargyrum c. cretâ are useful, as a check against excess. And when this does occur, our main reliance will be placed on mercurial influence, with topical depletion by leeches.

In the most favorable cases, we can scarcely expect a successful issue but by repetition of the tapping; and the amount of interval must be regulated by circumstances. In but one case have I ventured to operate. The first tapping proved highly satisfactory; the second terminated fatally by convulsions.

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[1] Watson's Lectures, Medical Gazette, March, 1841.

In connection with this chapter, besides the footnote references, see Dease, on Wounds of the Head, Dub. 1760; Pott, on Injuries of the Head, Lond. 1760; Pott's Surgery, by Earle, Lond. 1790; Desault, Œuvres Chirurgicales, Paris, 1812; Abernethy's Surgery, vol. ii, Lond. 1815; Brodie, on Injuries of the Brain, Med. Chir. Trans. vol. xiv, part ii, p. 335; Gama, Traité des Plaies de Tête, Paris, 1835; A. Cooper, Lectures on Surgery, Lond. 1835; Sharp, on Injuries of the Head, 1841; Guthrie, on Injuries of the Head, Lond. 1842.

CHAPTER IV.

DISEASES OF THE SCALP AND CRANIUM.

Erysipelas of the Scalp.

This disease may be idiopathic; and then it is usually of a mild character, so far as intensity of the local affection, and its effects on texture, are concerned. It is very apt, however, to supervene on wounds; more especially if numerous dragging stitches have been unwisely used to effect approximation; and, still more especially, if these stitches have been allowed to work their own way out by inflammation and ulceration. Such untoward accession to scalp wounds is also much favored, by ungenial conditions of the atmosphere at certain seasons; as well as by previous derangement of the primæ viæ, or habits of intemperance on the part of the patient (*Principles*, 4th Am. Ed. p. 335). If the phlegmonous form occur, danger to texture is great; by diffuse infiltration both above and beneath the tendinous expansion of the occipito-frontalis; and the constitutional symptoms are proportionally urgent.

The chief peculiarities of erysipelas of the scalp, in a practical point of view, may be considered to be;—the unfavorable nature of the parts for suitable treatment of the milder examples, on account of the presence of hair; the unfavorable nature of the parts, on account of the presence of a large amount of tendinous expansion, for safe progress of the more grave forms of the disease; and the dangerous propinquity of the affected part to an organ of the greatest importance, which is ever liable to suffer —either by extension of the inflammatory process, or by metastasis.

Treatment.—When erysipelas threatens to seize upon the scalp, either directly or by extension from the face, it is our first duty to have clean abrasion of the hair effected, so that the necessary measures may be fully in our power when the accession does occur. In the case of extension from the face, the disease is usually of the simple character and limited to the skin. And it is well to attempt to turn it from its upward course, by placing a guard by means of nitrate of silver (*Principles*, 4th Am. Ed. p. 158), while time and space still permit. For cure, hot fomentations, with or without punctures, usually suffice, in addition to the ordinary constitutional management. Cold, or other repellents, must never be employed; they may be grateful to the sensations of the patient, at the time; but the risk by metastases is overwhelming. Even the direct application of nitrate of silver to the erysipelatous part is not advisable; for a similar reason. Especial regard must be had to the interior of the head, both during the progress of the disease, and for some days after its apparent decline. For, it has not unfrequently happened, that convalescence has been suddenly—and perhaps ruinously—interrupted, by inflammatory reaccession, not in the part originally affected, but in the membranes of the brain. Throughout the treatment the head is kept high; the patient being almost in a sitting posture.

The chalybeate treatment is not contra-indicated; but must be conducted with special regard to the risk of cerebral disorder.

If the phlegmonous form declare itself in the scalp, and dangerous infiltration have already begun, we cannot too soon make the requisite incisions (*Principles*, 4th Am. Ed. p. 342) in those parts which plainly demand them. At first the knife need not pass beyond the sub-integumental adipose tissue, for the disease has, as yet, gone no deeper; but if, from neglect or otherwise, infiltration be already subtendinous, the knife must pierce tendon too; otherwise the invariably aggravating tension cannot be relieved; pain will increase greatly and the inflammatory fever will rise higher; matter will burrow rapidly over the pericranium, and probably beneath it also; and the disease will extend widely—perhaps involving the cranial contents, in at least a minor form. Timeous incision through the tendinous expansion is the only means whereby such extreme mischief may be mitigated; but it is surely better practice, by an earlier and less extensive wound, to prevent all such casualties; effecting recedence of the disease while it is yet limited to its original site, the skin and subintegumental tissues.

When burrowing of matter has taken place beneath the tendinous expansion, it is not necessary to lay the track open throughout its whole extent; but only, by the formation of a dependent opening—with a suitable counter-opening, if need be—to prevent purulent accumulation, and to afford the parts an opportunity of effecting reunion by granulation. To assist in this indication, uniform support by bandaging is very useful, after the acute stage has passed by.

When the scalp has been undermined by pus, even extensively, it does not follow that it must necessarily slough, in any part of the undermined portion. Its vascular supply is not so dependent on the subjacent areolar tissue as is that of ordinary integument; the course of the ramifications of the occipital and temporal arteries being rather cutaneous than subcutaneous; and the isolated skin—bearing its own vessels—consequently retaining its supply of blood but little impaired.

Aware of the dangers of erysipelas of the scalp, it is plainly our duty in the management of all wounds of the head—however trivial they may at first seem to be—to avoid everything, in part and system, calculated to induce an undue amount and kind of the inflammatory process; more especially if, by previous indisposition, or sinister atmospheric influence, the patient seem to be predisposed to erysipelatous accession.

Tumors of the Scalp.

Encysted tumors, commonly called Wens, are found more frequently on the scalp than in any other situation; and they are seldom single. In general they are regarded mainly as deformities; but when they inflame and open, they may become both troublesome and dangerous.

In some cases danger has arisen from the progress of mere growth; the calvarium having become absorbed, and consequently deficient, by the inward pressure of the tumor. The only advisable mode of treatment is removal by the knife. The main danger to be encountered is inflammation, assuming the erysipelatous character; and this must accordingly be provided against by suitable constitutional treatment, as well before as after the operation, and by gentle and careful management of the wound.

If the tumor be of large size, it is removed by regular dissection. By two elliptical incisions, of merely subcutaneous depth, the redundant integument is detached; and then the cyst, carefully preserved entire and tense, is leisurely dissected from its connections, and taken away along with the portion of sacrificed integument. The flaps of saved skin are then replaced; and, on oozing of blood having ceased, they are brought into accurate contact; the wound being treated with the hope of adhesion. Approximation is effected by strips of isinglass plaster; or by collodion and lint; and to facilitate the application of these retentive means, the surrounding scalp has been previously shaved. If oozing of blood have not wholly ceased, it is advisable to maintain accurate pressure on the whole wound for an hour or two, so as to prevent inward accumulation of coagulum, an event necessarily fatal to adhesion (*Principles*, 4th Am. Ed. p. 175). Indeed, such pressure is advisable after every such operation. Stitches are neither necessary nor advisable.

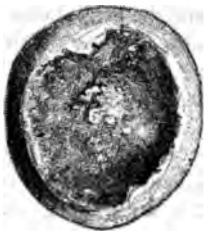
If the tumor be no larger than a nut, or small egg, it is unnecessary to remove any integument; and regular dissection is therefore not required. A more summary process suffices; that by incision, extrusion, of the contents, and evulsion of the cyst (*Principles*, 4th Am. Ed. p. 302).

If an encysted tumor, in a patient advanced in years, have inflamed and suppurated, and be in process of intractable ulceration, it is well to destroy the part effectually, either by escharotics or by excision—the latter method the preferable; for malignancy of action is otherwise apt to be assumed.

Solid tumors, of various kinds, are occasionally found in this locality. Of these, the most common is the adipose; seldom of large size; and amenable to the ordinary treatment—excision. Of whatever nature the tumor be, its removal should be early; ere incorporation has taken place, either with the scalp above, or with the fibrous textures beneath (*Principles*, 4th Am. Ed. p. 274).

Erectile tumors very frequently occur in the scalp. They are best treated by deligation; with or without previous reflection of the integument, according as this happens to be involved or not in the morbid structure (*Principles*, 4th Am. Ed. p. 525). The very large tumors of this class, sometimes met with on the side of the head, need not be tied all at once, but may be dealt with in portions; different parts being strangulated at different periods. Experience has proved that, in such cases, attempted excision is fraught with the utmost danger to life, and that deligation of the main arterial trunk, or trunks, is an insufficient remedial means; cases may occur, however, in which, as part of the cure, the principal arteries may be obliterated as they enter the tumor; the twisted suture being employed for this purpose, as in the case of veins (*Principles*, 4th Am. Ed. p. 538).[1]

Fig. 10.



Cancerous ulcer, from the scalp.

Malignant tumors occasionally form in the scalp; following the usual course; and amenable to the ordinary treatment. Benefit is to be expected only by free excision; and that can be practised with expediency only at an early period. Medullary tumors may commence in the soft tissues, and involve the hard secondarily; fully as often, they originate in the bone.

Malignant ulcer of the scalp is not uncommon; beginning as a warty excrescence; or the result either of an originally simple sore, or of an open and degenerate encysted tumor. Early and free removal is had recourse to: if the lymphatics as yet present no contra-indication.

Pericranitis.

The pericranium becomes the seat of an inflammatory process, with or without external injury having been applied. Acute, it may be the result of wound or bruise; following the ordinary course of such disease in fibrous tissues. Or acute suppuration may extend from the surface; as in erysipelas of the phlegmonous form. The usual antiphlogistic indications require to be fulfilled.

Idiopathic pericranitis is more frequently chronic than acute; and seldom occurs but in the adult, who is saturated with the rheumatic diathesis, or who has sustained injury of the system by mercury and syphilis—one or other, or both. The ordinary symptoms are present; pain, swelling, heat, tightness; and the nocturnal exacerbations are peculiarly marked (*Principles*, 4th Am. Ed. p. 364). The affection may resolve, leaving little or no structural change; or the resolution is incomplete, an enlargement of bone remaining—resembling a diffused node. Or true inflammation is established; and the bone suffers, to a greater or less extent, by ulceration, caries, or necrosis. Usually the periosteum of other parts of the skeleton is at the same time and similarily affected; and the bones most likely to suffer along with the cranium, are the clavicles, sternum, tibiæ, and ulnæ.

Treatment is mainly constitutional. The primæ viæ having been brought into a tolerably satisfactory condition, a sustained exhibition of the alteratives well known to be suitable to such cases is proceeded with —sarsaparilla and iodide of potassium, either together or alternately. The latter, especially, is found most beneficial. Locally, leeches and fomentations are applied, at first; then, counter-irritation. The inflammatory process having been removed, and its results only remaining, nothing is more effectual than the endermic use of a strong solution of iodine. Throughout the whole period of cure, the hair is kept either shaved or short. Atmospheric exposure is carefully avoided; and regimen is rigidly non-stimulant. If matter form acutely, it must be evacuated, freely and early. If the abscess be chronic, opening is delayed, and discussion by iodine attempted. Even when rough and spongy bone can be plainly felt through the chronic collection of pus, iodine should still be persevered with—along with the internal use of iodide of potassium—when the affection is dependent on a constitutional cause; for, in such cases, discussion is not unlikely to follow patient perseverance, even under circumstances by no means promising. Should acute or subacute accession supervene, however, the abscess becoming tense and crescent, let incision be no longer delayed.

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[1] Dr. Warren, American Journal of Medical Science, April, 1846.

In obstinate examples of pericranitis, causing mere change of structure, with slight swelling but great pain, the general health is apt to give way greatly, from want of sleep, and consequent exhaustion. In such cases it is essential to give opiates; and if the more proper alteratives have proved ineffectual, mercury may be given in guarded doses (*Principles*, 4th Am. Ed. p. 368).

Affections of the Cranium.

Abscess and ulcer of the cranium occur from ordinary causes; and are amenable to ordinary treatment (*Principles*, 4th Am. Ed. p. 381).

Caries of the skull is preceded and accompanied by interstitial absorption (*Principles*, 4th Am. Ed. p. 259); and seldom occurs but with

Fig. 11.

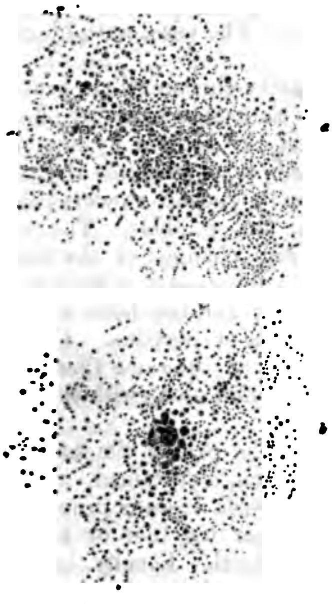


Fig. 11. Interstitial absorption in progress, in the cranium; at *a*, just begun; at *b*, more advanced. It may stop here; producing a merely cancellous state of the tissue; or it may advance, becoming merged in ulceration, and producing caries, as in Fig. 12.

Fig. 12.

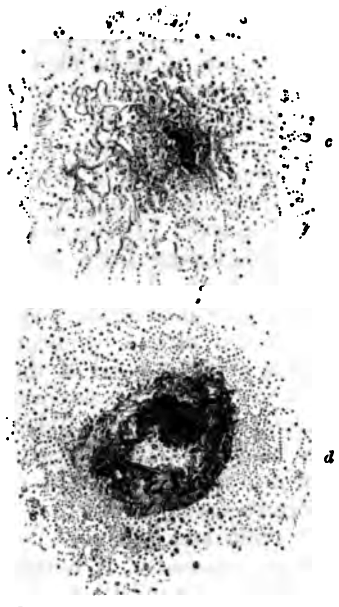


Fig. 12. Different portions of the same skull as in Fig. 11; at *c*, ulceration established, surrounded by interstitial absorption; at *d*, caries, with necrosis, in the centre—interstitial absorption still accompanying.

a vice of system—seeming to be rather a symptom and sign of this, than to constitute a disease in itself. And the predisposing vices of system are—scrofula in the young, and syphilis, mercurio-syphilis, or the ill effects of mercury alone, in the adult. Treatment, accordingly, is chiefly constitutional. Locally, the diseased structure is exposed; and removal of the carious surface is effected by the gouge, or by escharotics—chloride of zinc, or red oxide of mercury (*Principles*, 4th Am. Ed. p. 385). Sometimes Nature is provident in this matter; and herself effects the necessary clearance; the useless parts coming away spontaneously, as small sequestra. If the whole thickness of the cranium be involved, there is of course additional danger, by dura-matral involvement; and precaution requires to be exercised accordingly. Sometimes, unfortunately, a triumvirate of scrofula, syphilis, and mercurialism reigns in the system of the miserable patient; and then, as can readily be understood, the local affection proves particularly intractable.

Necrosis may involve the whole thickness of the skull; the result of wound or not—usually the former. Then, as already stated, there is risk to life by purulent accumulation between the bone and dura mater; and, if no external aperture already exist—as by fracture—the use of the trephine is demanded.

Fig. 13.

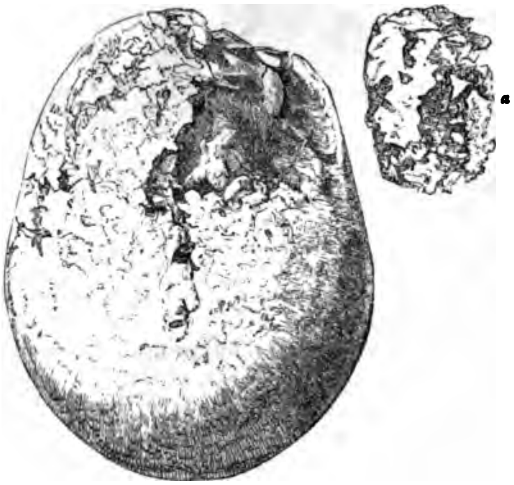


Fig. 13. Mercurio-Syphilitic Caries of the skull. *a*, A portion detached, in the form of sequestrum.

Fig. 14.

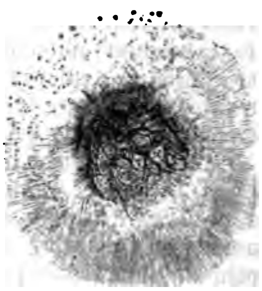


Fig. 14. Ulcer of cranium healed. The margins bevelled off, and sloping down. The surface studded with imperfect granulation. From the same cranium as Figs. 11, 12.

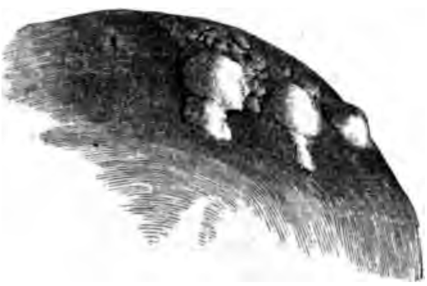
Exfoliation, or death of the external portion, is more frequent than complete necrosis; the result either of external injury, or of chronic idiopathic pericranitis. The usual course of superficial necrosis is followed, here as elsewhere. Ordinarily, we await patiently spontaneous separation, and then remove the sequestrum. Sometimes, when detachment is tedious, acceleration may be effected by the application of escharotics (*Principles*, 4th Am. Ed. p. 405). And sometimes it is necessary to interfere and forcibly elevate the dead portion, which, though separated from the hard textures, is yet confined by soft granulating structures around (*Principles*, 4th Am. Ed. p. 405).

In no form of necrosis of the cranium does the ordinary formation of cortical and substitute bone occur. And how fortunate such an arrangement is, at once becomes apparent, when we consider what would be the inevitable consequence of new bone bulging inwards on the dura mater. If the sequestrum have been superficial, healing is effected by a depressed cicatrix, as after simple ulcer of bone (*Principles*, 4th Am. Ed. p. 381). When the whole thickness has perished, atonement is made for the deficiency, as after the operation of trephining.

As in the case of caries, many examples of exfoliation of the cranium are dependent on the mercurio-syphilitic vice of system; and require constitutional treatment accordingly.

In connection with the traumatic form, it is well to remember that detachment of the periosteum—even rudely and with some bruising of the bone itself—does not render the occurrence of exfoliation inevitable (*Principles*, 4th Am. Ed. p. 393). The part may, and frequently does, recover. And the treatment, in the first instance, is to be conducted with a view to such a result; the flap of integument being carefully replaced, the wound approximated, and speedy healing sought for.

Fig. 15.



Several ivory exostoses clustered on the os frontis.

Exostosis of the cranium is not uncommon; of a dense, ivory character; and usually of small size. Fortunately the site of growth is usually on the external aspect of the bone. No treatment is required. The affection is a mere deformity; and not even that, unless apparent from want of covering by hair.

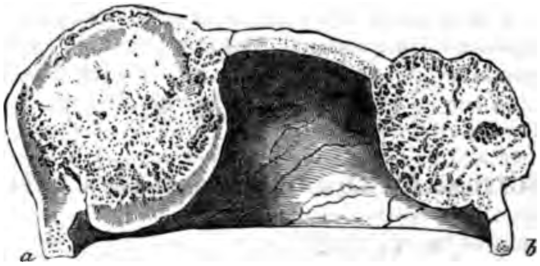
Spiculated exostosis sometimes grows from the interior of the calvarium; inducing intense neuralgia, or epilepsy. As already stated, there are some few cases so plainly marked as to admit of the offending body being removed by the trephine.

[In the previous edition, Dr. Sargent gives the following illustrations (Figs. 16 and 17, on next page), from Vidal de Cassis, of large internal, as well as external, exostoses. These developments are regarded as usually the offspring of syphilis; they are generally attended with fixed pain in the affected part, and gradually occasion more or less disturbance in the functions and physical condition of the brain.]

Tumors of the calvarium—osteosarcoma and osteocephaloma—are rare; more especially the true osteosarcoma. When they do form, no treatment save mere palliation is advisable. The site and connections of the affected part forbid operative interference.

Polypus of the frontal sinus is a rare affection; and, in its first stages, of difficult diagnosis. When detected, cure may be obtained by removing the bone to such an extent as will permit evulsion of the growth, with subsequent cauterization of its site.[1]

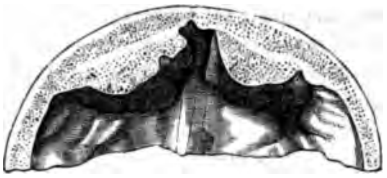
Fig. 16.



Large Exostoses of the cranium projecting both internally and externally at *a* and *b*.

Tumors of the dura mater involve the cranium secondarily. They are soft, fungating, and usually medullary. The original symptoms are necessarily obscure; but, after a time, the bone having yielded to absorption, the tumor manifests itself externally, and follows the ordinary course. Treatment is but palliative.[2]

Fig. 17.



Large Internal Exostoses.

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[1] Brit. and For. Med. Rev., Jan. 1846, p. 186.
[2] Boyer, Œuvres Chirurg. tom. iv. Velpeau, Dict. de Médecine, tom. x.

CHAPTER V.

AFFECTIONS OF THE ORBIT AND ITS CONTENTS.

I. AFFECTIONS OF THE ORBIT.

Orbital Inflammation

Is usually the result of injury, when primary. Sometimes it is of a secondary character, and unconnected with violence done to the part; an extension of inflammation from a neighboring part from the eyeball, or from the scalp. Most frequently it follows injury. And the affection is usually intense; suppuration being certainly and soon attained. Pain is great and increasing; tension is great, for swelling is hindered by the unyielding process of the periosteal lining of the orbit—termed orbital ligament—which confines the orbital contents in front; vision is more or less impaired by compression of the eyeball, and this organ, according to the amount of deep swelling, is more or less protruded; the eyelids are red and œdematous; inflammatory fever is intense, and the cerebral functions are often prominently disordered.

Treatment comprises the ordinary antiphlogistic indications. When a wound exists, careful examination is expedient, to ascertain whether or not any foreign substance—as straw, wood, iron—has penetrated and lodged; and if such an obvious exciting cause of inflammation be detected, it is forthwith removed. Leeches are applied in numbers; in some cases, general bloodletting may also be found advisable; and the antiphlogistic accessaries to bloodletting—aconite or antimony, purgatives, quietude, &c., will not be neglected; vomiting being avoided, for obvious reasons. The part is diligently fomented; and so soon as indications exist—however faint—of matter having formed, an evacuating incision is practised; it being obviously of the greatest importance to penetrate the orbital ligament at an early period of the suppuration. On evacuation of matter, the symptoms are speedily mitigated; the tension, throbbing, and intense pain almost immediately. If incision be delayed, spontaneous evacuation takes place; but not till after much suffering, considerable destruction of texture, and dangerous impairment of function in the eyeball.

Wounds of the Orbit.

These are usually of the punctured kind. As just stated, they are liable to prove the exciting cause of intense inflammation, more especially when there is lodgment of foreign matter. And the probability of the latter circumstance must always be regarded in practice. The wound having been ascertained to be clean and free, is carefully approximated; and cold is continuously applied, with much care, in order to avert inflammation, if possible, and secure union by adhesion (*Principles*, 4th Am. Ed. p. 555). If inflammation supervene, antiphlogistic treatment must be early and active; a suppurating wound is then inevitable; but we hope to avert deep and confined abscess, which is prone to form by extension of the inflammation beyond the wound's track.

But such injuries acquire a still higher importance, in reference to the parietes of the orbit. A penetrating wound of the orbit—as by a bayonet, pike, or pitchfork—is not unlikely to produce fracture of the orbital plate; and the fragments of the broken bone, driven inwards, are certain to penetrate or otherwise injure the brain or its membranes; endangering life, perhaps immediately, by extravasation of blood—more probably by the results of inflammation at a more remote period. Such wounds, therefore, require to be treated with the greatest caution. The extent of injury done to the bone is ascertained as soon, as accurately, and yet as gently as possible. If loose fragments are found to exist, these it is well to remove; the external wound being dilated, if need be, for this purpose. And when the spicula are certainly displaced inwards, injuring the important parts in that direction, an attempt should be made to take them away; whether they seem detached or firm. The indication is as paramount, as in punctured fracture of any other part of the cranium. This important part of the treatment having been satisfactorily accomplished—by dilatation of the external wound, and the suitable use of fingers, forceps, and probe—the patient is placed on his face, with the wound unapproximated, until bleeding cease; internal extravasation being thus rendered less likely to occur. Then the parts are brought together; and antiphlogistics are diligently employed, both locally and generally, in order to avert, if possible, an untoward amount and extent of the inflammatory process.

Tumors of the Orbit.

Hard Tumors of the orbital parietes are uncommon. The dense ivory exostosis produces little inconvenience, is usually of inconsiderable size, and requires no treatment. The cancellated exostosis—of a pedunculated character, and larger dimensions—may incommode the eyeball. If so, the nature of the case being plain—an incision may be made on the origin of the growth; its neck may be cut by the bone-pliers; and, by careful dissection, the offending substance may then be removed (*Principles*, 4th Am. Ed. p. 419). [The accompanying illustrations (Figs. 18 and 19, p. 89), may give a good idea of the distorting effect produced by an unusually large exostosis of the orbit, as well as of the happy result of the operation performed for the removal of the tumor. They are taken from an interesting report of the case (in Am. Jour. of Med. Sci., Jan. 1857, p. 35) by the operator, Dr. A. B. Mott, of New York.]

Soft Tumors are of more frequent occurrence. And they may be practically divided into three classes. 1. The simple and sarcomatous; amenable to excision. 2. The erectile; capable of cure, but not by direct operation. 3. The malignant; usually forbidding operation, and admitting only of palliation.

Fig. 18.

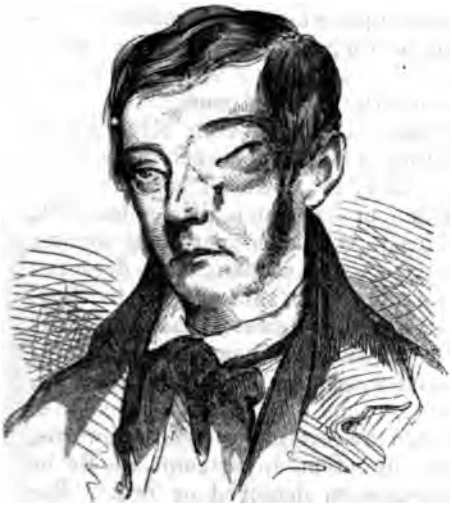
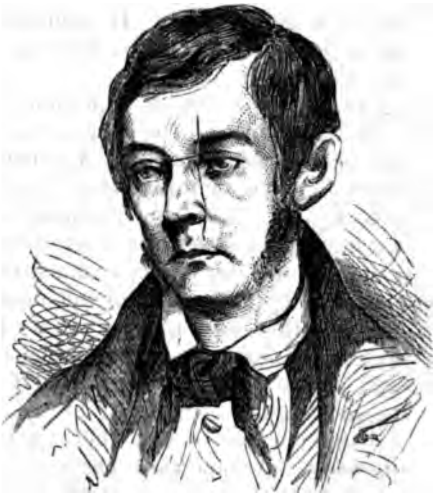


Fig. 19.



1. The simple tumors—simply sarcomatous, fibrous, fatty, cystic—may form in the orbital areolar tissue, unconnected with either the bone or its periosteum; and the growth may be either of idiopathic origin, or a remote consequence of slight injury. Enlargement is slow, gradual, comparatively painless, and unattended with inflammatory signs; not likely therefore to be mistaken for orbital abscess. As in the latter affection, however, outward growth is prevented by the orbital ligament; compression of the eyeball follows; and this organ may be more or less protruded from its socket. At first, sight is not lost, and scarcely even impaired; for stretching the optic nerve is gradual, and nervous as well as cerebral tissue has a very considerable power of accommodating itself to displacing agencies gradually applied. Ultimately, however, the stretching and displacement are attended with more or less impairment of vision.

By careful inquiry into the history of the case, we satisfy ourselves that the tumor is of the simple kind. Of what exact species it may be, it is not easy to determine; for the tense orbital ligament stretched over the swelling obscures tactile examination. Generally, however, we are able to satisfy ourselves on another point; whether or not the tumor is movable—connected or not with the bone and periosteum—consequently removable or not, entire, by operation. When convinced that the tumor is simple and movable, we do not hesitate to attempt its extirpation. A wound is made of sufficient extent, in a line parallel to the fibres of the orbicularis muscle. By cautious dissection, the tumor is reached and exposed. It is then laid hold of by a volsella, or hooked forceps; and evulsion outwards being steadily yet gently maintained, extirpation is rendered both easy and safe. The point of the knife is moved very warily, when near or in contact with the orbital parietes; for these, by the pressure of the tumor, may have been much attenuated; and a careless movement of the instrument might cause penetration. The eyeball and optic nerve are also carefully avoided. After removal of the tumor, the former is carefully readjusted in its proper place; and restoration of its functions usually ensues. The wound is brought together, and treated for adhesion.

Partial removal even of the simplest tumor, in this situation, is obviously inexpedient. For, reproduction will almost certainly occur from the portion which remains; and such second formations are very apt to prove of an unfavorable kind.

2. The Erectile tumor is occasionally found occupying the orbit. It is seldom congenital; but occurs suddenly, in after-life; and its origin is usually attended with a considerable amount of pain. At first an obscure deep swelling is found, causing more or less inconvenience; but as it enlarges, and approaches the surface, the ordinary characteristics of erectile tissue become sufficiently apparent. Often the cheek is covered with large veins—recipients of the blood from the more active vessels within.

This tumor cannot be treated directly; neither knife nor ligature are advisable. Yet, if no remedial means be adopted, the probable issue will be unfortunate; by enlargement, ulceration, hemorrhage; by involvement of the orbital parietes, and subsequent pressure on the brain; or by mere constitutional irritation. Experience has shown that deligation of the corresponding carotid is capable of effecting a cure; not by obtaining consolidation and obliteration of the dilated vessels; but, probably, by diminishing their supply of blood, removing the impulse of the heart's action, and so favoring resumption of the normal calibre. And free bloodletting, after the operation, would seem to contribute materially towards this result (*Principles*, 4th Am. Ed. p. 526).

3. Tumors of a malignant kind—medullary—are no unfrequent occupants of the orbital cavity. Generally they originate in the eyeball: but occasionally this is involved only secondarily—the origin being in the orbital areolar tissue, in the periosteum, or in the bone. The sole hope of cure is by extirpation of the whole orbital contents. And this is expedient only when the disease is recent, apparently limited to the soft parts, and capable of entire removal.

II. Affections of the Eyelids.

Injuries.

Ecchymosis is of frequent occurrence in the eyelids; the areolar tissue being lax and delicate. Ordinarily it is the result of a bruise or blow; but it may follow a wound, more especially if oblique or subintegumental; the application of leeches is almost certain to produce it, to a greater or less extent. It is important as a deformity. A patient, having received an injury likely to be followed by ecchymosis, is anxious that this should be prevented; and, the escape of blood having occurred, he is equally anxious that the discoloration should be removed. Many remedies are popularly in vogue for both of these ends. For the former, the continuous application of cold by wetted lint, with quietude and abstraction of all stimuli, is both suitable and easily obtained: if begun immediately on receipt of the injury, and properly maintained, the natural hemostatics will be much favored, and very probably little or no blood will escape from the torn vessels. Ecchymosis having occurred, the nature of the application must vary according to the presence or not of inflammation in the part; in the one case, fomentation is employed, subjugation of the morbid vascular process being the paramount indication; in the other, a solution of the muriate of ammonia, or other sorbefacient, is applied, in order to hasten removal of the extravasated blood by absorption.

Wounds of the eyelids, if contused, are treated by the water-dressing. If incised, approximation is effected by fine sutures; other retentive means being plainly inapplicable to this locality. Great care should be taken to restore the normal relative position with accuracy, lest deformity ensue.

In the case of burns, much precaution is required during the process of healing; lest by contraction ectropion supervene. And the careful dressing and bandaging necessary for this purpose is continued even for some time after the parts have healed.

Foreign Bodies.

Foreign bodies of small size—as particles of sand, dust, glass, coal—very frequently lodge in the eyelids, on their conjunctival lining. The patient, suffering much pain and irritation—with the eye already red, intolerant of light, and profusely lachrymating—applies for our aid on account of "something in his eye." Gently opening the eyelids, before a steady light, we scrutinize the eyeball in the first place; directing the patient to roll the organ in various directions, in order to facilitate such examination. If particles are found adherent, they are in general easily removed; by a curette, or flat end of a probe; by a hair pencil; or by a fold of a soft handkerchief. If fine dust only have lodged, fomentation and ablution will ordinarily suffice; assisting the lachrymation in its spontaneous cleansing effort. Sometimes it may be necessary to inject a gentle stream of tepid water, by means of a small syringe. In other cases, it is enough to shut the eye, or keep it shut, for a few minutes—occasionally blowing the nose; thus favoring the natural washing away of the foreign particles, by increased lachrymal and conjunctival secretion. The eyeball having been duly scanned, the lower eyelid is next examined; its conjunctival lining being readily exposed to a sufficient extent, by simple depression of the part. But the upper eyelid is the site most frequently occupied by the foreign substance; and it cannot be sufficiently exposed, without eversion. This is effected by placing a probe horizontally across the lid, above its cartilage; taking hold of the eyelashes with the finger and thumb; and bending the eyelid backwards over the probe. If the foreign matter be loose, it is removed by any of the means already mentioned. If it be firmly lodged, the point of a tooth-pick, or of a couching-needle, will most conveniently effect its dislodgment.

In certain occupations, particles of steel or iron are apt to get between the eyelids, and often become impacted in the cornea. When loose, they may sometimes be brought to the surface and removed, by means of a magnet of strong power; but generally the point of a couching-needle is required to effect their detachment.

When no assistance is at hand, the patient may himself, in many cases, get rid of the irritating matter; by elevating the upper eyelid with the fingers of one hand, and pulling it downwards, while he at the same time closes the lower, and pushes it upwards. Having pressed gently over the globe, the finger is then withdrawn, and the lids allowed to separate. The eyelashes of the lower lid are thus made to sweep the conjunctival lining of the upper; and it is in the latter situation, as already stated, that foreign bodies of small size usually lodge.

The foreign body having been removed, the eye is closed; light is excluded; and antiphlogistics are employed acccording to circumstances. It is plain that if the foreign substance be not removed, inflammation will certainly be established, and probably prove untoward and intractable. Cases are not wanting in which complete destruction of vision has been the ultimate result of but a small particle of foreign matter lodging in the conjunctival lining of an eyelid; perhaps with much injury done to the system by severe and sustained treatment directed against the inflammation and its results.[1]

Blepharitis.

The inflammatory process, attacking the eyelids, is so named. It may follow injury; assuming the ordinary character and course, and amenable to the ordinary treatment.

In erysipelas of the face, affection of the eyelids is usually a most prominent symptom; the laxity of their areolar tissue admitting of much and unseemly swelling. Punctures are usually necessary; not so much to abstract blood, as to evacuate serous effusion. After recession of the primary symptoms, this part must be closely watched; for, during convalescence, reaccession of the inflammatory attack is very apt to occur, advancing rapidly to suppuration (*Principles*, 4th Am. Ed. p. 189). And unless an early incision be made here, the abscess will be large, and the integument will probably slough.

Ophthalmia Tarsi.

By this is meant a congestion, or chronic inflammatory process, affecting the eyelids; more especially at their margins. The Meibomian follicles are prominently affected; and a viscous, disordered secretion adheres to the parts, tending to cause cohesion of the ciliary margins. More or less lachrymation, in general, exists. The eyelashes are stunted, or deficient. Itching, heat, and intolerance of light, are usually present; and the general expression is bleared and unpleasant.

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[1] Lancet, No. 1061, p. 435. One among many.

The disease will usually be found coexistent with some vitiated condition of the general system; and to that the treatment must by mainly directed. Not unfrequently, the constitutional vice will be found of the scrofulous character. If pain, heat, redness, and other ordinary characteristics of the inflammatory process exist at all prominently, blood is to be taken sparingly from the part, by scarification of the conjunctiva, or by leeches at the inner canthus. For a few days afterwards, fomentations, medicated or not, are to be applied. Then stimulants are used; such as solutions of zinc, or nitrate of silver; or the ung. nitratis hydrargyri diluted. In obstinate cases, counter-irritation is sometimes useful; and this is best effected by the application of blisters behind the ears. In children, the state of the gums and teeth must be looked to.

An advanced form of this chronic affection of the eyelids is sometimes termed *Lippitudo.* The ciliary margins are red, thickened, everted, and denuded of hair; and the eye seems to be surrounded by an angry red circle. The general expression is consequently very unpleasing; and the patient's discomfort is also great. Local and general alteratives are pre-eminently required; but they often fail to prove quite satisfactory. Stimulants applied to the parts are useful; such as pencilling the lids with a solution of nitrate of silver, and the like.

Not unfrequently, ophthalmia tarsi is but a part of a more general affection of the eye, of a strumous character.

Hordeolum, and other Swellings.

By Hordeolum, or *Stye*, is meant a circumscribed inflammatory swelling, which may either remain of an indolent and indurated character, or advance to suppuration. In the latter case, discharge of matter takes place, and discussion slowly follows. Very frequently the affection originates in a Meibomian follicle, and resembles an ordinary pimple. The follicle is obstructed, and its contents accumulate; an inflammatory process is then kindled in the perverted part, suppuration takes place, and the enlarged follicle becomes the seat of a small acute abscess.

Here, too, the general health will be found amiss; and purgatives, alteratives, with regulation of diet, will probably be required. While the swelling is nascent, fomentation and light poultices, or water-dressing, are suitable. When matter has formed, a puncture should be made at the apex of the swelling, for efficient discharge; and then water-dressing is again applied. If a chronic hardness should threaten to remain, discussion of this will be promoted by pencilling the part lightly over with a solution of iodine, or nitrate of silver.

An inflammatory swelling, similar to the true hordeolum, may form in the ordinary areolar tissue of the eyelid; resembling a small furunculus. It is amenable to ordinary treatment.

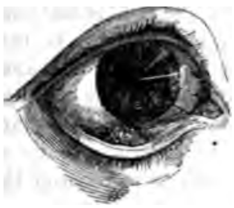
Small, hard swellings, of a whitish color, very superficial, painless, and almost stationary, occasionally form beneath the integument of the eyelid. According to their size, they are termed either *Grando* or *Milium;* according as they most resemble a piece of hail or a millet-seed. Causing deformity, they require removal. A scratch is made through the thin skin stretched over them, and the white pearly-looking substance is squeezed out. No escharotic is necessary. The wound scarcely bleeds, and heals simply.

Warts sometimes form on the eyelids. They may be taken away by scissors, ligature, or caustic.

Encysted Tumors of the Eyelids.

Encysted tumors are of frequent occurrence in this situation; more especially in the upper lid. They are usually of small size; the contents are white and glairy; the cyst is extremely delicate. Their site may be either subcutaneous or submucous; on the conjunctival or on the external aspect of the tarsal cartilage. The majority of the patients are of the female sex.

Fig. 20.



Encysted tumor of the lower eyelid. The lid everted.

Removal by regular dissection need not be attempted; the cyst is too delicate. And, for the same reason, incision, with evulsion of the cyst, is inapplicable. It is sufficient, in many cases, to incise the part, to squeeze out the contents, and with the point of a probe to disturb and break up the tender cyst. But, in some cases, it is well to apply an escharotic, so as to insure the cyst's destruction, and consequent non-reproduction of the tumor. The nitrate of silver is very suitable; escharotic enough to annihilate the cyst; and not likely to cause such loss of substance as would delay the cure, extend the cicatrix unnecessarily, or risk the occurrence of either inversion or eversion of the lid by contraction of the cicatrix. Incision is facilitated by effecting previous tension of the part. This is done by simply stretching the skin over the swelling, and cutting through the attenuated integument—taking care to make the incision in a direction parallel to the fibres of the orbicularis muscle; or by everting the lid, and then cutting through the stretched and prominent mucous membrane. Either form of procedure is the preferable, according as the site of the tumor happens to be subcutaneous or subconjunctival.

Hypertrophy of the Upper Eyelid.

The upper eyelid is occasionally affected by hypertrophy of both its integument and mucous membrane. The swelling is considerable, and causes deformity; it also obstructs vision; and there is an unpleasant puriform discharge.

By two elliptical incisions, a sufficiency of the diseased integumental texture is removed; and the wound is approximated by suture. The conjunctival change is subsequently remedied by scarification, followed by the use of sorbefacients. Or should the conjunctiva resist this gentler means, partial ablation of it may be practised, as in the case of the integument.[1]

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[1] Liston, Lancet, No. 1089, p. 489.

Cancer of the Eyelids.

Malignant ulceration is usually preceded, in the eyelids, by warty formation. The only cure is by excision; early and free. If the disease be limited, sufficient removal may be effected, yet without deformity or exposure of the eyeball; the wound being so shaped as to come well together by suture. But when the disease is extensive, and an operation warrantable, the prevention of deformity need not enter into our thoughts. One paramount indication is present—removal of all the diseased part. That must be effected, at whatever sacrifice of texture. When it is found necessary to remove the whole or greater part of the eyelids, more especially the upper, on account of malignant ulcer, it comes to be a question whether or not it be politic to spare the eyeball —supposing it to be apparently sound. Some writers recommend its removal at once, considering that the organ, being deprived of its natural protection, will be destroyed by inflammation. This, however, is not always the case. It is better to wait till this event has actually taken place, and then to induce collapse of the globe, by puncturing the cornea, and allowing the humors to escape; this is more safe and simple than immediate extirpation, and equally efficient.

Intractable ulcers of the eyelids—not malignant—are best treated by regard to the state of the system, more especially of the digestive organs; and by occasionally touching the parts with the fluid nitrate of mercury or nitric acid. Sometimes they are of a syphilitic character; obviously dependent mainly, for cure, on constitutional treatment.

Closure of the Eyelids.

By the term *Anchyloblepharon* is understood, union of the eyelids at their tarsal margins; congenital; or accidental, the result of cicatrization after burn or scald. When congenital, the cohesion is seldom to a great extent; occupying only the angles. No interference may be deemed necessary. When more extensive, causing not only an unseemly deformity, but likewise interfering with vision, separation of the preternaturally united parts may be readily effected by incision. Afterwards, all necessary means should be taken to prevent reunion; each lip of the wound being made to cicatrize separately, by granulation. When the closure is complete—a circumstance of rare occurrence—a fold of the parts should be first raised from the ball, and cut through in a horizontal direction; through this aperture a director is carefully introduced; and on it the subsequent division to the angles is safely effected. The accidental form is amenable to similar treatment. But greater care is necessary, in the after-management, to avoid reunion. This is prevented by the interposition of dressing, frequent movement of the parts—and, if necessary, by forcible separation of the lids by plaster, and the application of some gently astringent lotion.

By *Symblepharon* is meant adhesion of the eyelids to the eyeball; seldom congenital; usually the result of cicatrization after injury. In some cases, the cicatrix is dense and contracted; admitting of no attempt at cure. In others, the adhesions are comparatively slight, and there is sufficient laxity of texture. In these latter, the lids are to be liberated by careful dissection; their separate cicatrization being afterwards carefully attended to. Reunion is much more liable to take place in symblepharon than in anchyloblepharon; and is best prevented by frequent motion of the eye, by proper dressing, and by the occasional introduction of a probe to separate the new adhesions. The temporary insertion of an artificial eye has been suggested; but even the most persevering exertions have often proved unsuccessful.

Lagophthalmos.

Lagophthalmos, or Hare-eye, means an inability to close the eyelids; and the eye being deprived of its natural protection is exposed to the action of the air and other external irritants, which may cause inflammation of the conjunctiva, eventually terminating in opacity of the cornea. The disease often results from paralysis of the orbicularis muscle; more frequently it is caused by retraction or shortening of the lid, arising from contraction following abscess, or burns, and other injuries. Sometimes it proceeds from cold or other causes acting upon the facial nerve in its transit or distribution.

The treatment varies according to the cause. When the affection arises from paralysis, blisters, friction, electricity, and strychnine are appropriate; when from retraction of the lid, division of the cicatrix may be of use; and when from affection of the facial nerve, leeches, blisters, and stimulants in the course of the nerve are to be employed. When it is caused by cerebral congestion, antiphlogistic remedies are to be had recourse to.

Ptosis.

Ptosis is a falling downwards of the upper eyelid; producing no inconsiderable deformity, and seriously interfering with vision. It may constitute a disease of itself; or it may be but a symptom of serious affection of the brain. When original, it may depend on debility of the elevating muscle, or on superfluity or thickening of the integument; or it may be connected with both of these circumstances.

Redundancy of integument is easily got rid of, by removing a sufficient portion, either by knife or by scissors. Atony of the muscle may be overcome by stimulant frictions, the passing of electricity, or the endermic use of strychnine. Ordinary means having failed, an operation may be had recourse to. A large portion of integument is removed from the eyelid, and also from a corresponding portion of the eyebrow; the two raw surfaces are then brought into apposition by suture, and when union has taken place the lid will be elevated by the action of the occipito-frontalis muscle, to such an extent as to admit of useful vision.

In the secondary form, dependent on affection of the brain, treatment must of course be directed to the cerebral disease.

Trichiasis and Distichiasis.

Trichiasis denotes inversion of the eyelashes, whereby much irritation is induced on the surface of the eyeball. The inversion may implicate the whole cilia, or only a few. It may occur in either lid; but is most frequent in the upper. The position of the eyelid itself is not altered. At first there is merely inconvenience; but, sooner or later, an inflammatory process is established on the surface of the eyeball, and consequent danger to vision may prove great.

Treatment is either palliative or radical. The former consists in evulsion of the erring cilia, from time to time, and mitigation of the irritation and inflammation which they may have occasioned. For evulsion, a pair of broad-pointed forceps with their opposing surfaces in accurate contact, are required; for the hairs are usually both slender and light-colored; and the assistance of a lens is often necessary. This method is on the whole unsatisfactory; and is only applicable to those cases in which but few of the cilia are in fault.

To effect a radical cure, it is essential that the lashes be not only removed, but that their non-reproduction shall be insured. One of two methods may be followed. The errant cilia may be plucked out, and their bulbs destroyed. Or the bulbs and cilia both may be removed by cutting instruments. The former method is applicable to the partial trichiasis; the latter to the complete. If the former be chosen, an incision is made with the point of a lancet, on the free margin of the lid, down to the roots of the inverted cilia; into this little opening a needle or another lancet, coated with powdered tartrate of antimony, is inserted —allowing it to remain so that its coating may dissolve there; and the hairs are then pulled out. A small pustule forms, and the bulbs are destroyed.[1]

When it is our object to remove not only the cilia but their bulbs, a horn spatula is introduced beneath the lid, an incision is made down to the tarsus along the whole length of the inverted portion, parallel to, and about a line from the ciliary margin, to which it is to be connected at each extremity; the ciliary edge is then to be laid hold of with forceps, and the integuments carefully dissected from the cartilage, so as to include the bulbs without interfering with the mucous edge of the lid. When the part cicatrizes, little deformity will result. Or, the margin of the lid is laid hold of and stretched by the fingers of the left hand, or by forceps; and by the stroke of scissors, or the sweep of a fine bistoury, the requisite amount is taken away. By operating in this way, more deformity will be produced than by the former plan; but by either the eyeball will be freed from a continual source of irritation.

By *Distichiasis* is understood a row of supernumerary cilia, growing inwards, and causing the same unpleasant and untoward results as the foregoing affection. The same treatment is required as for trichiasis. But more careful examination is expedient; inasmuch as the observer is apt to be deceived by seeing the ordinary eyelashes of their normal character, and, even when the lid is raised and scrutinized, the paucity, slimness, and paleness of the stray lashes may often cause them to be overlooked;—a serious matter; for unless they be noticed and removed, the inflammatory process will not only become established, but will prove uncontrollable. To detect them readily, the lid should be inspected laterally, as well as in front, and the patient should be desired to turn his eye in different directions, so as to form a dark background of the iris and pupil.

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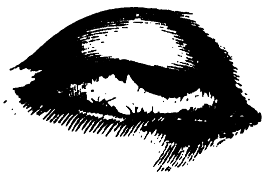
[1] Edinburgh Monthly Journal, April, 1841, p. 259.

Entropion.

Fig. 21.



Entropion, affecting both eyelids.

This is a turning in, not only of the eyelashes, but of the margin of the eyelid itself, attended with all the unpleasant consequences of trichiasis, in an aggravated form. It may be temporary or permanent. In the former case, it is the result of inflammatory swelling of the eyelid; "the tumefied conjunctiva pressing out the orbital edge of the tarsus, while its ciliary margin is turned inwards by the action of the orbicularis."[1] When permanent, it may depend on relaxation of the integument of the lid, whereby displacement inwards of the ciliary margin is both permitted and favored; or on contraction of a cicatrix on the conjunctival aspect of the lid, whereby the ciliary margin is directly pulled inwards; or on a perverted form having been assumed by the tarsal cartilage itself, in consequence of ophthalmia tarsi, psorophthalmia, or other chronic disease. Either eyelid, or both, may be affected.

It is evident that treatment must be both early and suitable, if we wish to save the eyeball from serious injury. In the temporary form, it will be sufficient to oppose inversion by the application of retracting plasters, frequently renewed, until the cause of displacement has been removed by treatment directed towards subjugation of the inflammatory process and dispersion of its swelling. In the permanent form, operative interference is essential. If the integument be redundant, a portion is to be removed. And it is necessary that, in the first instance, a very careful examination be made, to determine how much is to be taken away, so as to insure rectification of the position of the eyelid; while yet we avoid removing an unnecessary amount, and so causing an opposite condition of the parts—ectropion. A horizontal fold is pinched up by suitable forceps, or by the fingers, and is removed by either knife or scissors. The edges of the wound are then united by sutures, and adhesion follows. Escharotics may be employed for the same purpose; but they are inferior to the cutting instruments, being possessed of no exactitude as to the amount of texture to be destroyed. Sulphuric acid is the most effectual, not only destroying skin, but consolidating the areolar tissue, and producing eversion by contraction of the granulations. When acid is used, a piece of round, hard wood is dipped into it, and applied behind the tarsal cartilage in a line extending the whole length of the inverted portion. Cold water dressing is applied, and in a few days the slough separates, the granulations contract, and the lid is restored to its proper position. The eye, however, must be carefully guarded from the acid, during its application, by a piece of wetted lint introduced between the lid and the globe. This action of sulphuric acid causes in general exquisite pain, and is only applicable to cases where the patient will not submit to an operation by sharp instruments.

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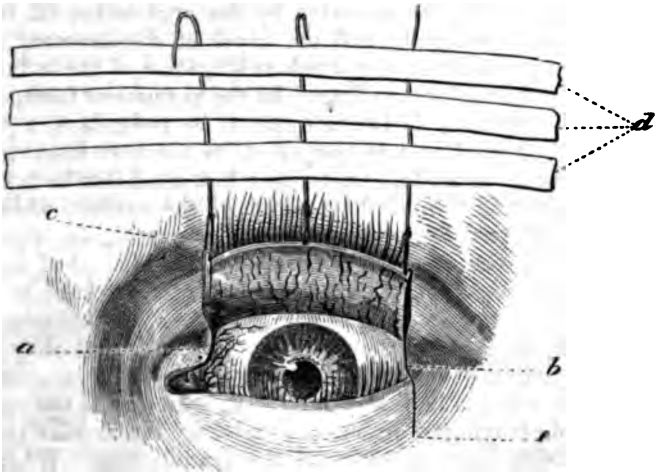
[1] Littell, on Diseases of the Eye, p. 95.

When the disease is dependent on a perverted state of the ciliary margin and tarsal cartilage, one of two methods may be adopted. The cilia and their bulbs may be removed, as for trichiasis; care being taken to leave the puncta lachrymalia intact. Or, by such an operation as the following, an attempt may be made, retaining the eyelashes, to liberate and restore them to their normal position: "The patient having been placed in a sitting posture, and the head supported by an assistant, the inverted lid is separated from the globe of the eye by means of the finger or a sharp hook; and then with a pair of strong scissors, two perpendicular incisions are made through the tarsal cartilage, each about a quarter of an inch in length, the one upon the temporal, the other upon the nasal side, avoiding the punctum, and including the whole inverted portion of the lid. This part being now everted, and held in that position, the two perpendicular incisions are connected by a horizontal incision upon the conjunctival surface, close to the ciliary margin, by means of a scalpel; cutting through the conjunctiva and tarsal cartilage, and leaving the inverted portion of the margin united to the rest of the lid merely by the integument. And especial care is taken that the knife does not penetrate through the skin." Water dressing is applied. And "the success of this operation depends in a great measure on the edges of the incision being prevented from uniting by the first intention, particularly the horizontal incision upon the conjunctival surface. This is effected by everting the lid occasionally during the first few days, and by touching the edges immediately after the operation with the sulphate of copper, so as to cause them to suppurate and heal by granulation."[1]

Fig. 22.



[Mr. Guthrie's operation.—*a*, *b*. The perpendicular incisions. *c*. The ligatures supporting the lids. *d*. The confining stripe. *e*. Line of incision in a case of inversion of the lower lid. (From Lawrence, Am. Ed.)]

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[1] Dublin Medical Press, July 27, 1842, p. 54.

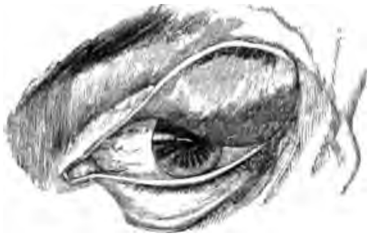
Another operation [see Fig. 22] for entropion consists in making a perpendicular section of the lid, with scissors, at each canthus, from a quarter to half an inch long; taking care not to wound the punctum. An elliptical portion of skin is then removed from the outer surface of the lid. Two or three ligatures having been introduced through the skin at the tarsal margin, the eyelid is everted by means of them, and drawn up towards the eyebrow; in which position it is retained for a few days, by the ligatures being fixed to the forehead with a strip of adhesive plaster. In the meantime, the exposed mucous membrane is covered with a piece of wetted lint; and as the perpendicular incisions heal by granulation, a sufficient degree of eversion will be produced.

Mr. Tyrrell recommended that the lid should be merely divided at its centre by a single perpendicular incision. The pressure caused by the contracted cartilage was thus relieved; and as the wound, shaped like an inverted Λ, became filled by granulations, very little deformity would result. Both operations are only applicable to cases where the disease arises from a contracted state of the cartilage.

Ectropion.

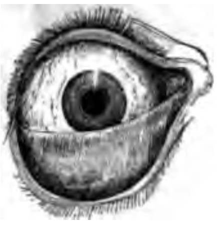
Ectropion denotes an opposite condition of the eyelid; its eversion; and is more frequently met with in the lower, than in the upper lid. The conjunctival lining is exposed, the eyeball is partially denuded, and much deformity is produced. After a time, the exposed palpebral conjunctiva loses much of its membranous character; the surface of the eyeball becomes irritable, inflames, and undergoes change of structure—probably fatal to vision; and a degree of epiphora invariably exists, in consequence of the natural course of the lachrymal secretion towards the puncta being interrupted. The malposition most frequently results from contraction of cicatrices of the integument; and these may exist in the eyelid or its immediate vicinity; in the corresponding cheek, or extensively on the face and neck, as after severe burns (*Principles*, 4th Am. Ed. p. 604). The lower eyelid is the more frequently affected. The cicatrix may follow a burn, wound, sloughing abscess, or exfoliation; the first and last are the most unfavorable.

Fig. 23.



Ectropion, affecting the upper eyelid; the result of exfoliation.

Fig. 24.

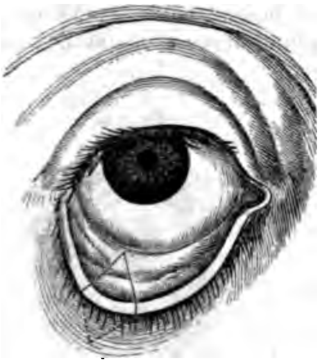


Ectropion, affecting the lower eyelid.

Ectropion, however, arises from other causes than the contraction of sores. Simple relaxation of the lower lid will produce it; and this may depend on flabbiness and redundancy of all the component textures, or on atony only of the fibres of the orbicularis. The last circumstance is no uncommon occurrence in old people. Frequently ectropion is caused by a faulty condition of the conjunctival lining of the lid; which is the seat of swelling, of either an acute or chronic kind. And it is well to remember how general inflammatory swelling of the lid is able to cause either inversion or eversion, according to the accident of displacement; just as a similar condition of the prepuce may be the cause either of phimosis or of paraphimosis. Eversion is no uncommon attendant on purulent ophthalmia; from the acute and great swelling of the lid, more especially in its conjunctival lining. It also results from an indolent enlargement and thickening of that membrane. The accidental division of either canthus, too, may cause it; the lid becoming loose and pendulous. Or it may arise from an elongated and irregular state of the tarsal cartilage.

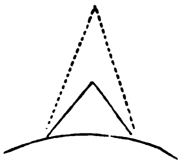
Treatment necessarily varies according to the nature of the cause. Acute swelling of the eyelid and its lining is subdued by the usual means. Chronic enlargement of the membrane is first treated by scarification, and astringents. If these be resisted, the redundancy may be removed, either by curved scissors or by caustic; the former obviously to be preferred; great care being taken lest, by the removal of too much, entropion be produced. Atony or paralysis of the fibres of the orbicularis may be combated by the usual means; but, generally, this form of the affection, occurring in those of advanced years, may be regarded simply as one of the many signs of decay, and irremediable. When there is elongation of the tarsal cartilage, or redundancy of the whole lid, abbreviation, sufficient to restore normal position, is effected by a simple operation. Towards the centre of the lid, a triangular portion of its whole thickness is to be removed in the form of the letter V [see Fig. 25]; the margins of the wound are brought together by suture, a proper compress is applied, and when the parts heal the lid will be in close apposition to the globe. In case of faulty cicatrices, the procedure is more difficult and less promising. Occasionally, the simple division of a tight adhesion may suffice for liberation and replacement. But generally, there is loss of substance connected with the cicatrix, and consequently simple incision proves inadequate. In the case of a moderate cicatrix, at some distance from the ciliary margin, amendment,

Fig. 25.



[Plan of this operation. (From Lawrence, Am. Ed.)—Ed.]

Fig. 26.



Plan of this operation; the dotted line marking the original wound; the plain line representing the flap of skin in its new and elevated position.

if not complete restoration, may be accomplished as follows: Supposing the lower eyelid to be affected, a V wound is made, through the integument only, the apex pointing to the cheek. By means of the knife's point, the included skin is freed a little from its areolar connections; and resilience upwards is favored by the necessary manipulation. Displacement upwards is then definitely secured by bringing together laterally the wound that remains beneath, by means of sutures. In not a few cases, there is not sufficient laxity of parts to admit of this. Under such circumstances, something may be done by incising the eyelid, and replacing its ciliary margin; then filling up the chasm beneath, which necessarily results, by a flap of integument borrowed from the adjoining cheek. When ectropion has resulted from accidental wound at the canthus, rectification is easily obtained by reunion of the divided parts; the margins of the cicatrized wound being made raw by paring, and retained in accurate apposition by suture.

Blepharoplastics.

When either eyelid has been partially or totally destroyed, by injury, or by disease not of a malignant kind, an attempt may be made, not without good prospect of success, to supply the deficiency by a suitable flap brought from the immediate vicinity. No precise rules can be given for such an operation; the details must necessarily vary in each case.[1]

III. AFFECTIONS OF THE LACHRYMAL APPARATUS.

Epiphora. Stillicidium.

Epiphora consists in an increased secretion of tears, which flow over the cheek. *Stillicidium lachrymarum* depends on some affection of the excreting lachrymatory apparatus, which prevents them from taking up the tears as they are secreted.

The watery eye may be either congenital, or the result of injury or disease. It is best treated by means of astringent collyria; by weak solutions of nitrate of silver, or wine of opium, dropped upon the eye once a day; or by exposing the eye to the vapor of laudanum; and by using at the same time some weak red precipitate ointment to the edges of the lids at night, when there is any derangement of the Meibomian secretion.

In all cases, not prominently connected with some more important affection of the eye, the state of the general system must be carefully looked to; for it is extremely probable that no slight declension from health will be found; and, unless this be remedied, all local treatment will prove of comparatively little avail. When a watery eye results from a contracted state of the puncta, these are to be dilated by means of fine probes, or a stiff bristle. When there is relaxation or atony of the lachrymal sac, then stimulating injections or collyria are to be used. These are thrown into the sac by means of Anel's syringe, through the punctum. Occasionally, a small blister applied over the sac is of use.

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[1] London and Edinburgh Monthly Journal, 1843, p. 359. Cyclopædia of Practical Surgery. *Sub voce.*

When the nasal duct is obstructed, measures must be taken to effect its clearance. Often the watery eye is but a symptom of general ophthalmia, and is only to be cured by its subjugation.

Xeroma denotes an opposite condition; a dryness of the eye, dependent on deficiency of the lachrymal secretion. Frequently it is a temporary prelude to graver affections of the eye, of an inflammatory nature. When it occurs singly, and persists—as is but seldom—restoration of the secretion is to be courted by ordinary stimulant means.

Inflammatory Affections of the Lachrymal Sac.

The areolar tissue over the lachrymal sac sometimes is the seat of an inflammatory process; while, in the first instance, the sac itself is free. A red, itchy, painful swelling exists at the corner of the eye; and the system sympathizes slightly. The cause usually is exposure to cold. Purging, and antimonials internally, with low diet, and pencilling of the affected part with nitrate of silver, or tincture of iodine, will ordinarily suffice to obtain resolution. If they fail, then local depletion by leeching must be had recourse to; the leeches being applied over the part itself. It is obviously of much importance to be early and active in such treatment; so as, if possible, to prevent involvement of the lachrymal sac. If suppuration should occur, a very early incision should be practised; lest perforation of the sac take place. Not unfrequently, notwithstanding every precaution, the sac in involved, and suppurates acutely. The same treatment is necessary; an early evacuating incision, or enlargement of the spontaneous opening; and light water-dressing afterwards. The opening granulates and heals; and usually the breach in the sac closes, leaving its cavity unoccluded.

The Lachrymal Sac may itself be the primary seat of acute inflammation. This may occur idiopathically in those of weak system; or in any one, after exposure to cold. A small, hard, circumscribed, and very painful swelling is formed below the tendon of the orbicularis muscle; the superimposed integuments soon become red; the eyelids are more or less œdematous; the corresponding side of the nostril is dry; and the system sympathizes considerably. The swelling increases, often almost obscuring the eye; and severe headache usually is complained of. The course of the tears is obstructed, by the tumid state of the duct's lining membrane—inflammation having extended to it—and they find their way over the cheeks. Suppuration occurs; and, sooner or later, the matter is discharged externally. Then a slow recovery may ensue; the nasal duct becomes again open, the tears resume their proper course, the suppurated aperture granulates and heals. Or the obstruction in the nasal duct remains, the tears do not reach their wonted outlet, the aperture contracts but does not heal; and the condition of fistula lachrymalis is established. In severe and neglected cases—more especially if occurring in a debilitated frame—the subjacent periosteum may be destructively involved, and tedious exfoliation ensue.

Antiphlogistics are obviously demanded here; leeches over the inflamed sac, warm anodyne fomentations, and a full dose of morphia at night, to allay pain and procure rest. These ought to be used early to avert suppuration if possible. When matter has formed, it must be evacuated at once. This is done by introducing a bistoury into the sac, below the tendon of the orbicularis, which ought to be rendered prominent by drawing the lids outwards. After evacuation, light water-dressing or poultice is applied; and the sac, after a time, may be occasionally syringed with warm water. We hope that the membrane of the duct will duly recover from its tumid state, that the natural course of the lachrymal fluids will be restored, and that the outward opening in the sac will close.

A chronic affection of the lachrymal sac is not uncommon; the vasculer process reaching no higher than congestion, and limited almost entirely to the lining membrane. An indolent swelling occurs beneath the tendon of the orbicularis, soft, fluctuating, comparatively painless, and capable of being emptied by pressure; for the puncta remain open, and through them the puriform secretion escapes upwards. The passage downwards is obstructed; and, indeed, this circumstance seems in most cases to be the origin of the malady.

Sometimes this chronic distension of the sac is the result of an acute or subacute attack. In other cases, it is chronic from the first; and in these, the state of the general system is usually unsatisfactory. There is a constant liability to acute accession, from but slight causes; and when such an aggravation does occur, the progress is likely to be rapid and untoward. Suppuration and outward discharge take place; and fistula lachrymalis is established, perhaps with necrosis of the os unguis.

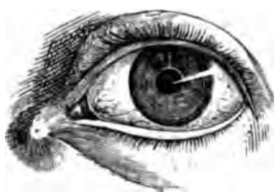
Treatment consists in prophylactic care, so as to avert such untoward events; in attention to the general health; in maintaining a comparatively empty state of the sac, by occasional pressure; and in the use of stimulant injections, collyria, or ointments. Sometimes vesication over the sac, by nitrate of silver or tincture of iodine, is of use; at other times, the application of a few leeches will prove serviceable.

It is in such cases that Anel's syringe is of most use; to clear out accumulated discharge, and to convey alterative and stimulating fluids to the congested membrane. For overcoming structural obstruction in the nasal duct, any such injection is quite inadequate.

Fistula Lachrymalis.

How this condition is produced, has already been explained. Obstruction takes place in the nasal duct; the lachrymal sac inflames, suppurates, and ulcerates—the ulcerated aperture discharging externally; and the wound, only contracting, does not heal. This train of events may originate in the lachrymal passages, and usually does so. But the origin may be in the subcutaneous areolar tissue, as already stated; or in the bone and periosteum, in those with a mercurio-syphilitic taint of system. The greater number of cases, however, are of a simple nature; originating in the lachrymal passages; and involving the deeper parts secondarily, if at all.

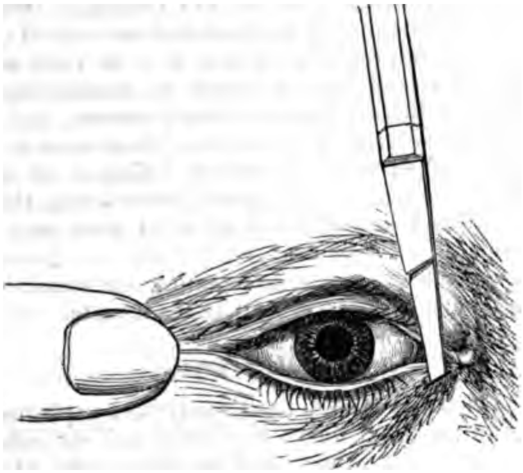
Fig. 27.



Fistula lachrymalis. The chronic stage established; and the aperture small.

The essential parts of the disease are, obstruction in the nasal duct, and an external opening in the lachrymal sac. In treatment it is our object to close the latter; and that can be done only by removing the former. To this end, an operation is necessary. The patient having been seated on a chair, with the head supported, a narrow sharp-pointed straight bistoury is inserted into the fistulous opening beneath the orbicularis tendon; and is not only lodged in the sac, but pushed into the osseous nasal canal as well. To accomplish this dexterously, reference to the anatomy of the parts is necessary, in order that the penetrating instrument may receive the requisite direction; downwards, a little backwards, and a very little inwards. By the side of the bistoury a stout probe is passed down; and as the former is slowly withdrawn, the latter is pushed steadily onwards, until it has overcome the obstruction, and is felt to touch the floor of the nostril. To effect this perforation, a little force is sometimes necessary. A few drops of blood, escaping by the nostril, prove re-establishment of the duct complete; also, if the patient be made to expire forcibly, while the nostrils are shut, air and bloody mucus will be ejected upwards through the duct, if the probe have been withdrawn.

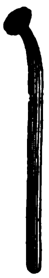
Fig. 28.



[View of operation for Fistula Lachrymalis, from Wharton Jones.]

But it is not enough that the knife and probe procure a temporary re-establishment of the canal. This must be kept permanently open. And to accomplish this, *styles*—or small bougies—are employed; of various sizes, and made of silver. One about the thickness of an ordinary probe, and sufficiently long to reach from the upper wound to the nasal aperture of the duct, is lodged in the canal; its flattened head resting on the integument. No fixed size can be defined as generally suitable for the commencement of the treatment. It is enough if the style pass easily, after the withdrawal of the ordinary probe. Having been lodged, it is allowed to remain. After some hours, the usual resenting of the presence of a foreign body is evinced. The part becomes hot, painful, and swollen; still, the exciting cause is not to be removed; the style is left untouched. Fomentation, or a poultice, and the minor general antiphlogistics are employed; and usually, after a day or two, the inflammatory signs subside, the style feels loose again in its site, and a purulent discharge escapes freely by it. After a few days of quietude, the original style is withdrawn, and one a size larger gently substituted. This, in its turn, gives place to a third; and so on; until one is passed of sufficient bulk completely to occupy the canal; the passage being syringed once a day with tepid water, to keep it clean. This last style is worn for some considerable time, until there is good reason to suppose that the normal calibre of the passage is fully restored, and that its lining membrane has returned to a tolerably sound condition. Then the instrument—which has only been taken out occasionally, for the purpose of being cleaned and replaced—is withdrawn, and a smaller substituted. This, after having been worn for some days, is succeeded by a less; and by this gradual abstraction of the stimulus, relapse is rendered improbable. Then if the tears continue to flow naturally, and all else seem favorable, the use of the instrument may be wholly abandoned; and the external aperture, now much contracted, may by permitted and encouraged to close entirely. Frequently no aid is necessrry to secure this latter event. But should a small fistula threaten to prove obstinate, the touch of a heated wire, or point of caustic, will usually effect its contraction and closure.

Fig. 29.



Style for the lachrymal duct.

At one time, tubes were employed instead of styles. Experience, however, has declared them to be inferior. They create the same disturbance in the part, are apt to become obstructed, equally require occasional removal, and, in some cases, their attempted removal has been attended with the utmost difficulty.

At one time, also, it was no uncommon practice to seek a more direct road to the nasal outlet, than through the obstructed lachrymal duct; by perforation of the os unguis. This destruction of unimplicated texture, however, is in the present day very properly deemed unwarrantable.

If necrosis accompany the condition of fistula lachrymalis, exfoliation must be patiently awaited; for not until the dead portion of bone has been thrown off, can the soft parts be expected to heal. At the same time, constitutional treatment will certainly be necessary.

It is well to remember that fistula lachrymalis may be simulated, tolerably closely, by malignant disease. A medullary tumor, or a malignant polypus, formed in connection with the nasal passages, may project towards the surface at the inner angle of the eye; and its first prominence, yet covered by the stretched and attenuated integument, may occupy the exact locality of the lachrymal sac. But a touch of the part will evince elasticity instead of fluctuation; a glance at the nostrils will show the true seat of the disease; and the cachectic face and general appearance will sufficiently testify to the malignant character.

Obstruction of the Nasal Duct.

We can readily understand how this should be a not unfrequent result of an inflammatory process in the lining membrane. The membrane is at first turgid by soft exudation; and this narrows, and may obstruct, the canal. Such obstruction is temporary in its nature, and capable of yielding to ordinary treatment, whereby absorption of extraneous deposit may be obtained. But if the process continue, exudation becomes more and more dense, and more enduring; partly mucous in its site, but chiefly submucous; and by continuance or aggravation of such structural change, diminution and obstruction of the canal are rendered plainly inevitable.

For the minor form of obstruction, rectification of the general health, counter-irritation applied over the part, and the use of sorbefacient collyria or injections, will ordinarily suffice. In the more advanced form, the stimulus of the lodgment of a foreign substance in the part is essential to efficient restoration by absorption. In some instances, this indication may be fulfilled without incision; by passing a probe upwards, from the nasal orifice of the duct. The probe, *Gensoul's*, bent nearly to a right angle, at about three-fourths of an inch from its point, is passed carefully along the floor of the nostril, until it arrives below the anterior extremity of the inferior turbinated bone; then its point is directed upwards, into the canal. This manipulation is always doubtful, in the first instance, on account of the valvular protection by which the nasal orifice of the duct is guarded, and which must be forcibly broken up; often it proves most difficult to the surgeon, and both teasing and painful to the patient; not unfrequently it fails altogether. It should never be attempted, unless after repeated practice on the dead body. And, even when the introduction can be effected with tolerable facility, it is not unlikely that such means will in the end be found quite inadequate to remove the disease. In all serious cases of obstruction in the nasal duct, therefore, it is better at once to have recourse to the same treatment as for fistula lachrymalis; to puncture the sac, and proceed with gradual dilatation by styles.

Obliteration and Absence of the Nasal Duct.

1. The nasal duct may be obliterated by change of structure in the membrane. Restoration by perforation may be attempted. 2. It may be shut up entirely by change of structure in the bone. Then restoration in the original site is hopeless; and if anything remedial is attempted, it can only be by perforating the os unguis, and rendering the unnatural aperture permanent.

A case is related by M. Berard, of congenital absence of the nasal duct; from which there had resulted a congenital fistula, which continued open and discharging at the age of twenty-one. An artificial outlet was formed for the secretion, by perforation of the os unguis.[1]

Dacryolites.

Concretions are sometimes found in the lachrymal passages; mainly lodged in the sac; and consisting chiefly of carbonate of lime, cemented by concrete mucous and albuminous matter. The foreign substance produces swelling and lachrymation, and may ultimately cause fistula. Its presence is easily detected by manipulation, and by the introduction of a probe through one of the puncta. The remedy is simple; incision and removal. The wound may be expected to heal kindly, and without any fistulous tendency. In minor cases, mere expression, without wound, may prove sufficient.

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[1] British and Foreign Review, No. 24, p. 541.

Affections of the Lachrymal Gland.

Dacryadenitis.—The lachrymal gland may be the seat of an inflammatory process, chronic or acute; but either form of attack is rare. The secretion is first increased, afterwards arrested, and then restored in a perverted form. A painful swelling forms in the region of the organ; the eyeball is displaced, and inconvenienced in function and movements. The eyelids are œdematous; and the conjunctiva is apt to sympathize and take part in the morbid process. In the acute form, the system suffers severely; the pain grows intense and shoots through the head; and suppuration may take place. If the matter be discharged spontaneously, a fistulous aperture may remain.

The treatment is according to general antiphlogistic principles; when matter forms, an early and free opening is to be made.

Atrophy of the Lachrymal Gland may take place, but this is very rare; the organ ultimately becoming almost effaced. Then either xeroma results; or the conjunctival secretion is augmented, to atone for the glandular deficiency.

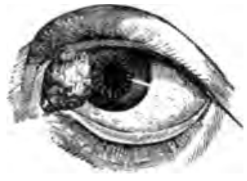
Tumors of various kinds may form in the substance of the gland. It is liable to simple hypertrophy; amenable to discutients. Sometimes it is the seat of cystic formation; remediable by simple puncture—or, if that fails, by excision. Carcinoma may attack the gland. Then there is obviously no hope but from early removal. And, in extirpation of the eyeball on account of malignant disease, it is well always at the same time to remove the lachrymal gland—its occupation now gone—whether involved or not; lest, by its continued presence, return and reproduction of the tumor should be favored.

Encanthis.

By this term is meant an enlargement of the caruncula lachrymalis. The enlargement may be a simple and somewhat acute engorgement of the part, the result of an inflammatory process resident therein. This will readily give way to ordinary treatment—scarification, or leeching, fomentation, and sorbefacients.

A chronic swelling, of the nature of hypertrophy or simple tumor, may occur; less amenable to discussion, and often resistful of it. It slowly increases; producing deformity by its prominence and bulk; displacing and obstructing the puncta and lachrymal canals, whence troublesome lachrymation results; preventing due closure of the eyelids; and favoring the occurrence of ophthalmia.

Fig. 30.



Encanthis.

If discutients fail, under such circumstances, excision is to be practised; care being taken to leave the puncta, canaliculi, and lachrymal sac uninjured.

Sometimes the caruncle is the seat of tumor of a malignant, or at least suspicious character. In such a case discussion is hopeless; and palliatives of any kind are not employed, if excision be practicable. By early as well as free removal only, can immunity from return be hoped for. It is very rarely, however, that excision of this texture, on any account, is required.

IV. Affections of the Eyeball.

Ophthalmia.

In such a work as this, it is not to be expected that so wide a subject as the affections of the eyeball—so important, varied, and numerous—should be fully discussed, in all its details. The leading points only can be overtaken; the student being referred for further information to the many excellent monographs in this department of Surgery.

Ophthalmia is the general term in which all affections of the eyeball of an inflammatory nature are comprehended; and, according as the superficial or more deeply-seated textures are involved, the ophthalmia is said to be External or Internal.

Fig. 31.

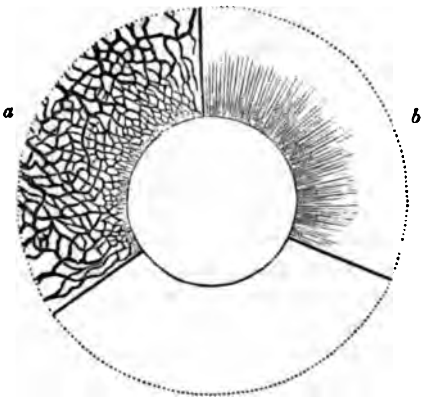


Diagram showing the characteristic vascularity of external and internal ophthalmia. *a*, external; *b*, internal.—W. Jones.

Affections of the Conjunctiva.

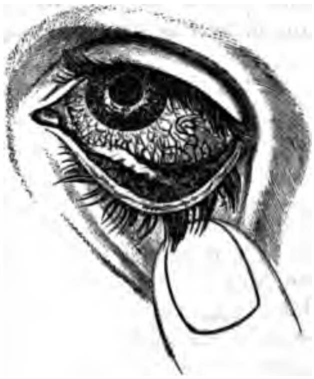
The inflammatory process, in all its grades, is very frequently found established in the conjunctiva; and the affection varies materially, not only according to the intensity of the process itself, but also according to the cause which induced it, and the state of the system in which it has occurred. Different varieties of the disease may in consequence be enumerated. The most prominent of these are the Simple, Purulent, and Strumous.

Simple Conjunctivitis.

The eye becomes the seat of pain, heat, and lachrymation; there is intolerance of light, and consequent shutting of the eyelids—more or less spasmodic; frequently there is a sensation as if sand or other foreign matter were lodged in the part. On separating the eyelids, the membrane is seen to present an appearance of unusual vascularity; not from formation of new vessels, but from enlargement of those already there.

It is important to remember that these vessels have a peculiar character, whereby affection of this membrane may be distinguished from the affections of more deeply-seated parts. The vessels are of considerable size, they seem to advance from the periphery of the globe, where the membrane is reflected from off the palpebræ, are tortuous in their course, freely inosculate with each other, and terminate gradually at the margin of the cornea; they are also observed to follow the movements of the membrane; sometimes they are distinct and separate, because not very numerous; sometimes they are numberless, constituting one mass of angry red; and the redness is usually of a bright scarlet hue (Fig. 31, *a*). Whereas, in sclerotitis the vessels are small, straight, not affected by the movements of the eyeball, appear first near the margin of the cornea, become paler towards the periphery of the globe, do not inosculate, plainly occupy a deeper plane, and cause a redness of a pink or purplish hue (Fig. 31, *b*).

Fig. 32.



External ophthalmia; catarrhal conjunctivitis.

In what is strictly termed Simple Conjunctivitis, the range of the inflammatory process does not reach higher than active congestion. Effusion takes place copiously; partly beneath the conjunctiva, but chiefly external to it. If the crisis of true inflammation be approached, a temporary drying up of the discharge, with aggravation of all the symptoms, marks the untoward advance.

The system is sympathetically involved; but, in general, its disorder is neither prominent nor severe.

The disease may occur *per se;* or be but a part of a more general inflammatory attack. Not unfrequently, it is merely a symptom of eruptive fever; as in measles and small-pox.

The predisposing causes are numerous: over-exertion of the organ in many ways; derangement of the general health; a glaring, sunny, or dusty season. The exciting causes are equally numerous: exposure to cold, heat, wind, or light; the application of all chemical and mechanical irritants, directly; and the indirect influence of irritant causes, more remotely. The most obstinate forms of the disease are to be expected, when the exciting cause is by a direct irritant which remains in constant operation; as when a particle of sand, dust, or glass, lodges in the membrane, or when it is constantly rubbed or fretted by stray eyelashes.

In the treatment, our first care is to remove the cause. Then antiphlogistics are to be used; but these need not be of the highest class. If the cause—as a foreign substance lodged in the membrane—have been removed at once, nothing may be required in addition to rest of both body and part, low diet, abstraction of light, and continuous application of cold over the shut eyelids by means of wetted lint. The inflammatory process may be entirely averted; or, if just begun, it may very speedily resolve. If not, then blood is to be abstracted locally, and transition made gradually from cold cloths to warm fomentations. The blood may be drawn from the temple, or by cupping at the nape of the neck; or by the application of leeches in the neighborhood of the eye itself. The last method and locality are generally preferred; and care should be taken that all the animals fasten near the inner angle only, immediately beneath the tendon of the orbicularis; for there less pain will be occasioned, more blood will be drawn, and less risk both of ecchymosis and of erysipelas will be incurred, than when application is carelessly and diffusely made along the eyelids. The amount of local depletion will of course vary according to the intensity and duration of the disease, and the age and constitution of the patient.

The process may simply and steadily resolve; or may pass from the acute to the chronic condition, and there tend to remain. It is to be borne in mind, that in all cases of this affection, not of a traumatic origin, and not occurring in a robust and vigorous frame, the chronic condition, a state differing little from that of mere passive congestion, is very apt to be assumed at an early period—after the lapse of but a few days. Then, continuance of antiphlogistics would but aggravate the morbid state. A change has to be made. It may be advisable to unburthen the distended vessels; and this will be best done, by scarification of the conjunctiva on the lower lid. By fomentation, the flow of blood is encouraged; and after this has ceased, gently-stimulating collyria are employed, to restore tone to the vessels;—solutions of zinc, alum, or of nitrate of silver, are the best; or a dilution of vinum opii begun very weak, and gradually increased in strength. Also the ordinary stimulus of light is again gradually admitted. In those cases in which amendment is tardy or fluctuating, it is well to adopt the aid of counter-irritation; which is best applied by blistering, behind the ear.

Constitutional treatment is not to be neglected during any period of the case; first moderately antiphlogistic, then alterative, and ultimately tonic. If the occurrence of the attack have been connected with the drying up of any habitual or normal discharge, return of this should be sought for and secured.

When one eye only is affected, it is well to remember the close sympathy which exists between the two organs. The unaffected eye, therefore, should, during the acute stage, be kept equally quiet and shaded from the light, and otherwise treated with prophylactic care. Confinement to a dark room is not generally necessary, however; and when the case is chronic, free exposure of the organ to the open air will often prove beneficial.

In the obstinately chronic cases, a beneficial change may often be obtained by the application of nitrate of silver in solution, or very lightly in substance, to the inner surface of the lower lid immediately after scarification.

A common variety of simple conjunctivitis is termed the *Catarrhal;* whose prominent characteristics are—in addition to those of the simple form—a profuse secretion of vitiated muco-purulent fluid from the membrane, œdema of the eyelids, irritation of the tarsal margins, less intolerance of light, more marked remissions, and the presence of the usual indications of catarrh.

Purulent Conjunctivitis.

Purulent ophthalmia seems to be merely an aggravated form of catarrhal conjunctivitis; running its course, however, much more rapidly; and mainly distinguished from the latter, in its mild form, by the discharge being purulent instead of muco-purulent. But when purulent discharge occurs in the simple form, an aggravation of the inflammatory process having been somehow induced, such a circumstance is to be regarded as an accidental intensity in acute simple conjunctivitis, rather than as an example of true purulent ophthalmia. Usually, inflammation is from the first intense, and suppuration is very speedily attained. The first symptoms are pain and itching in the palpebral conjunctiva, and often there is a sensation as if foreign matter were lodged there. Then the ordinary characters of conjunctivitis appear, in an aggravated form. The pain is not confined to the eye, but shoots through the head, and not unfrequently extends to the face also. The eyeball becomes quickly covered with meshes of enlarged conjunctival vessels; the membrane itself is infiltrated and tumid; a profuse purulent secretion is poured out; the eyelids are swollen, and œdematous, often to a great extent; ordinarily, the eyeball is concealed by the tumid lids; on opening them forcibly, purulent matter escapes in increased quantity, and eversion is apt to ensue—the engorged and red conjunctiva becoming exposed.

As the disease advances, the conjunctival lining of the eyelids, more especially of the upper, changes from the uniform, vascular, and villous appearance, to one of more irregularity, as if granulating. The conjunctiva is then said to be *granular*. This term, however, does not imply that the membrane becomes actually studded with true granulations; the fleshy elevations being mere enlargements of the natural papillæ. These continue to furnish a profuse discharge; and the friction of them over the ocular conjunctiva doubtless maintains the general morbid condition.

The ocular conjunctiva, it has been already said, undergoes change of structure. Exudation and extravasation take place both interstitially and beneath it. Serum, or fibrine, if the disease be very acute, is effused between it and the sclerotic, causing it to bulge considerably over the margin of the cornea, and leaving that texture in the relative position of a depression or dimple. This state is termed *Chemosis;* the result of true inflammation in the conjunctiva. When the affection is acute, and the chemosis great, the cornea is in danger of sloughing; partly from the mere intensity of the inflammation, and partly by the strangulating effect of the surrounding swelling, checking the supply of blood to the cornea, and causing it to die from want of nutrition.

The system sympathizes to a great extent. At first inflammatory fever is developed. Afterwards, the form of Constitutional Irritation is often assumed. Vision is in imminent danger, by change of structure in the cornea, and also by disorganization of the entire globe; for to the latter result this affection may advance, under circumstances of either neglect or severity.

In Egypt the disease prevails as an epidemic, and has done so for ages; of the most virulent and intractable form; very fatal to sight;

originally induced by sun and sand, propagated, also, by direct contagion; and in effecting reproduction by the latter mode, the flies are said to be active agents—passing from one eye to another, tainted with the contagious matter. In this country, it is happily both less frequent and less severe. It may follow injury; and then the purulent discharge is to be looked on as the mere consequence of a high amount of inflammation induced by a powerful exciting cause. Want of cleanliness, and of ventilation, and the over-crowding of inmates—as in schools and barracks, and on board of ship—predispose to the production of this form of disease, under the influence of a comparatively slight exciting cause. Thus occasioned, it is undoubtedly contagious; the matter of one patient applied to the sound conjunctiva of another being capable of inducing a similar affection. And when many patients happen to be crowded together, without due cleanliness and ventilation, there is good reason to believe that the infectious character is also acquired.

Treatment, in energy and promptitude, requires to be proportioned to the rapidity and intensity of the disease. It is only by active and early, as well as suitable measures, that we can hope to avert change of structure and impairment of function. When the patient is robust and plethoric, and there is intense supra-orbital pain, headache, chemosis, and a feeling of tension and throbbing in the eye, blood is to be drawn not only from the part, but from the system; with a full antiphlogistic effect in view. The bowels are to be well acted on. Regimen should be most sparing; with quiet, and seclusion from all stimuli—light more especially. If not strongly contra-indicated, by constitutional or other causes, calomel and opium are to be freely administered, to excite gentle ptyalism; for the inflammation is intense, the texture delicate, and the function important (*Principles*, 4th Am. Ed. p. 149). The eye is to be diligently fomented with an anodyne fomentation.

If the case be not seen till the disease has made progress, and lost much of its acute type, both locally and constitutionally, such severe measures are of course unwarrantable. And a like reservation will be required in the case of the puny adolescent, perhaps scrofulous as well as sickly, who may happen unfortunately to become a victim.

When the second stage has set in, we cease from constitutional antiphlogistics—though still maintaining the most guarded regimen; the local, too, are proceeded with differently. The swollen conjunctiva is to be freely scarified, in order to empty its sanguineous contents, and at the same time to afford ample space and opportunity for the interstitial and subconjunctival exudation to escape. The palpebral conjunctiva is divided with a lancet or scarificator, in a horizontal direction; the eyelids being freely everted for this purpose; and separation of the lids ought to be maintained for some time, so as to favor the escape of blood. The chemosed ocular conjunctiva is to be divided also in a horizontal direction; otherwise, the cornea, already in a critical condition, will have its sloughing accelerated and made certain by interruption of the vascular supply. Or, rather, the incisions are begun at the corneal margin, and made to radiate outwards to the circumference, as recommended by Mr. Tyrrell; there being thus less risk of cutting across the vascular supply of the cornea, than in any other form of incision. This incision of the chemosis is not always to be reserved for the second stage; but is often highly expedient at an early period, when the affection is yet acute; in order to save, if possible, the threatened cornea, as well as to obtain a general resolutive effect upon the inflammation. Fomentation is to be used for some hours after the scarification, so as to favor the flow of blood; and then the nitrate of silver is advisable. Probably the best way of employing this remedy is to apply it, either in substance, or in solution, to the eyelids; on these it exerts a direct and powerful remedial effect, opposing the congested and granular state; and from these it is gradually diffused over the globe, with an effect more gentle but equally beneficial. The application is made daily, or every second day, according to circumstances. Throughout the whole treatment, it is essential that matter be not allowed to accumulate beneath the swollen and shut lids; these are to be gently opened from time to time, and the pus washed away by warm water, or by some gently astringent fluid—anodyne or stimulant, according to the stage of the disease. For general use, there is nothing better than a weak solution of nitrate of silver dropped into the eye once or twice a day.

It ought to be borne in mind, throughout the whole period of treatment, that the discharge is of a contagious nature; and the patient, practitioner, and attendants should guard accordingly against direct propagation of the disease.

If the morbid state still persist, and become more and more chronic in character, the nitrate of silver may be well superseded by some more purely stimulating remedy; as the sulphates of zinc and copper. Or some of the preparations of mercury may be employed; in form either of ointment or of solution. At this period, too, counter-irritation, by blistering behind the ears, or on the nape of the neck, will not be without its use. The state of the system throughout the whole course of the disease, must be well considered; often a combination of tonics with alteratives will probably be required.

When a swollen and altered state of the palpebral conjunctiva obstinately remains, after comparative disappearance of the other symptoms, this lingering one must be attacked with more energy. The sulphate of copper or nitrate of silver is applied lightly over the parts. Or the enlarged granulations may be at once removed, either by knife or scissors. The surface which remains is then made the subject of ordinary treatment. Of course, care must be taken that the removal of texture be not excessive; otherwise entropion is likely to ensue.

Such is the nature of the ordinary Purulent Ophthalmia. Two varieties of the disease require a separate though brief notice.

Ophthalmia Neonatorum.—By this term is understood Purulent Conjunctivitis occurring in the recently born child. It may be induced by mere want of cleanliness, by imprudent exposure of the delicate organs of sight to intense light, or by the direct application of other stimuli. But frequently it owes its origin to contamination of the conjunctiva by vaginal secretion—during parturition. The disease presents its ordinary characters; and there is much risk of permanent loss of sight by pearly opacity of the cornea.

Children have been born with opaque cornea, apparently the result of purulent conjunctivitis. It has been inferred, therefore, that this disease may occur in utero. Such opacity, however, may be the result of mere arrest in development.

The treatment is founded on antiphlogistic principles; proportioned to the age and condition of the sufferer. But much depends on an early commencement being made. Then mild measures suffice; bleeding will seldom be required, either by leeches or by scarifications; and counter-irritation, also, will rarely be necessary. It is enough to employ simple ablution, frequently repeated—perhaps every second hour; soon gently medicating the collyrium by means of alum, decoction of oak bark, or other astringent—the proportion of which is gradually increased. A weak solution of nitrate of silver dropped into the eye, once a day, is of much benefit. Great attention to cleanliness is to be always maintained, and the eyelids should be prevented from adhering together, by applying a little red precipitate ointment to their edges at night. Attention is at the same time paid to the primæ viæ, and general system.

Gonorrhœal Ophthalmia.—The application of recent gonorrhœal matter from the urethra to the conjunctiva, produces the most intense form of purulent conjunctivitis. One eye ordinarily is affected; for it is seldom that both are at once inoculated; and in this respect there is a difference from the common purulent conjunctivitis. In the latter also, the morbid process usually commences in the palpebral conjunctiva, resides there chiefly, and extends only secondarily to the ocular portion of the membrane. But in the gonorrhœal form, the reverse is the case; the disease would seem, in most cases, to commence in the ocular conjunctiva, and to extend thence to the palpebral. Inflammation is unusually intense; and the hazard to vision is great: for the cornea, surrounded by a firm fibrinous chemosis, is in a most perilous state, and not unfrequently perishes by sloughing. Or the inflammation may pass deeply; and terminate in general disorganization of the globe. The treatment is in no way peculiar; only proportioned in activity to that of the disorder. General bleeding ought seldom to be omitted at the outset; and this may be regarded as imparting a proper tone to the rest of the treatment. Strong solutions of nitrate of silver are found to be of much service, so soon as the first acuteness of the inflammation has been subdued. The rest of the treatment is similar to that already recommended in ordinary purulent conjunctivitis; but it should be borne in mind that this disease is more acute, and runs its course more rapidly than the other.

Strumous Conjunctivitis.

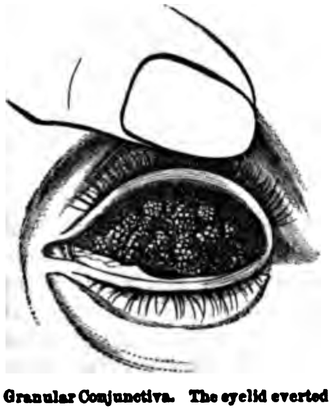
This affection of the membrane—in addition to the ordinary traits of the strumous cachexy—is characterized chiefly by remarkable photophobia, or intolerance of light; often with comparatively little pain, and vascularity—though sometimes the vascularity is considerable; by tendency of the enlarged vessels to collect into fasciculi which stretch towards the corneal margin, terminating there in pustules or phlyctenulæ; by exacerbations occurring in the morning, while there are remissions at night—the opposite of what obtains in other ophthalmiæ. Corneal change of structure, as ulcer, is extremely apt to ensue. The affection seldom occurs after puberty; and *prevails* chiefly during childhood. At that age, the intolerance of light, with spasmodic closure of the eyelids and copious lachrymation, is certainly the most prominent symptom. The child "keeps its hands pressed on the shut eyelids, and turns its face on the nurse's shoulder, or, if in bed, on the pillow, even in comparative darkness. In chronic cases, the edges of the lids are kept in this manner in an almost inverted condition, and the eyelashes get under and are there retained, augmenting the distress." The cheeks are scalded by the discharge which almost constantly wets them, and become covered with an angry eruption. The features are contorted; and a confirmed expression of pain and discontent is assumed. On attempting to open the lids, much suffering is occasioned; the lachrymation increases, the lids become more inverted, and the eyeball is rotated upwards and outwards so as to conceal the cornea.

The treatment consists in constitutional management, suited to this particular cachexy conjoined with an inflammatory process in an important part: in slight local depletion by leeches; in applying nitrate of silver to the integument of the lids, lightly, so as to blacken merely; in the use of a weak solution of this substance as a collyrium; and in counter-irritation by blistering behind the ear. The last remedial means, however, is to be used with caution; otherwise it is apt to excite troublesome scrofulous enlargement of the cervical glands. Sometimes benefit is obtained by the local use of belladonna, smeared over the eyelids, which seems to act as a sedative in such cases. Or it may probably afford relief by temporarily paralyzing the iris, and so placing that contractile texture in a condition of repose. In the early stage of the disease, an emetic is generally of much service. No medicine, however, seems to act so beneficially as quinine, which often displays a decided influence in allaying the morbid sensibility, relieving the intolerance of light, and removing the inflammation. For bathing the eyes, warm water is used, simple or medicated with opium. The child should have a solid and nutritious diet, and should not be confined to the house, unless during cold and wet weather.

Granular Conjunctiva.

The granular condition, dependent on a hypertrophied state of the mucous papillæ, of the palbebral conjunctiva, has been already noticed——as constituting an important integral part of purulent conjunctivitis. But a similar change of structure may occur, quite independently of this latter disease. It may be the result of chronic inflammatory process resident in the palpebral membrane. At first, doubtless, there is mere enlargement of the normal structure; but after a time, this is more or less altered by continuance of plastic deposit; the surface becoming dense as well as prominent, rough, irregular, and sometimes fissured. The upper eyelid is more prone to suffer than the lower.

Fig. 33.



Granular Conjunctiva. The eyelid everted.

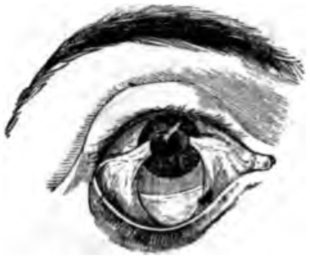
It can be readily understood how such a structure, at each movement of the lid, must greatly fret the ocular conjunctiva; causing an irritation there sufficient to light up the inflammatory process, and more than sufficient to maintain an affection which has been already established. To remove the alteration of structure, therefore, becomes a most important therapeutic indication. In the first instance, scarification of the eyelid is to be employed; followed by the application of nitrate of silver, used either lightly in substance on the part, or in strong solution. If the nitrate prove unsatisfactory, other astringents may be employed instead. Failing these, the altered part is to be removed; by knife or caustic. The nitrate of silver, or sulphate of copper, may be applied firmly to the surface, so as to have a destructive effect. But in general, it is better to remove at once, by knife or scissors, the enlarged granules; great care, as usual, being observed, lest by excessive ablation entropion be established on cicatrization. The general health ought in all cases to be attended to, as the disease frequently occurs in lymphatic or strumous individuals. Repose of the eye ought to be enjoined, with due attention to diet, exercise, and change of air.

Pterygium.

Pterygium denotes a vascular and fleshy thickening of the ocular conjunctiva. The formation is of a triangular form; the base resting on the internal or external canthus, and the apex stretching towards the cornea. When of moderate size, and not advanced further than the corneal margin, vision is not interfered with; but when it begins to encroach on the cornea, the affection then ceases to be a mere deformity or inconvenience; sight is in danger; and remedial measures are required. Sometimes the web is thin and membranous; consisting chiefly of varicose vessels held together by fine areolar tissue. Sometimes the structure is dense, firm, and fleshy; sometimes it contains a large proportion of adipose substance.

The term *Pannus* is applied only to those cases in which the cornea is completely covered with red vessels, presenting the appearance of a piece of red cloth, and very materially interfering with vision.

Fig. 34.



Pterygium, double.

In the milder cases of Pterygium, a cure may be attempted by scarification and astringents; the scarifications being made across the dilated vessels, in the sclerotic conjunctiva. In those cases in which the cornea is encroached upon, excision of the sclerotic portion is to be had recourse to, if the milder measures fail—as they are likely to do. The membrane is elevated by a fine hook, and carefully removed by knife or scissors. The corneal covering is then usually found to disappear. When, in Pannus, the whole cornea is covered, a cure is said to have been effected by inoculation of the morbid tissue with the discharge of purulent conjunctivitis; the inflammatory process which thence results having the effect of breaking up the morbid tissue, and rendering it amenable to removal by absorption. This, however, is a very dangerous mode of treatment; the eye may be lost in consequence of the violent inflammation which is induced, and the patient's health may be much injured by the severe measures which may be requisite to subdue that inflammation. Such procedure, therefore, is plainly inapplicable, except to those extreme cases in which the cornea presents no sound part, but is completely and thickly covered; and in which, consequently, the condition of the eye can scarcely be made worse.

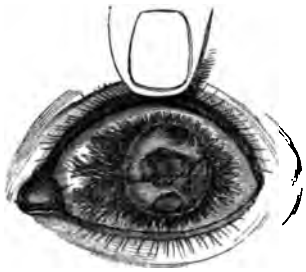
Affections of the Cornea.

Corneitis.

The inflammatory process, affecting the cornea, may be either an original affection, or merely an extension from previously existing conjunctivitis. It may originate either from injury done directly to the part itself, or from an exciting cause applied to some other part of the surface of the eye. The conjunctival investment only may be involved; and this is most likely to occur when the affection is a mere extension from conjunctivitis; or the disease may be mainly and originally resident in the proper substance of the cornea. All forms of conjunctivitis, when of any duration, are apt to implicate the cornea; but the strumous form more especially.

A red zone of dilated vessels encircles the corneal margin, generally at the upper part; and between the two there is no intervening clear space of white sclerotic, as in affections of the deeper parts of the eye. When the conjunctival covering is involved, small hair-like vessels are seen ramifying on it, in greater or less number, continuous with those constituting the outer zone. When the proper substance alone is affected, such vascularity is, in the first instance, not discernible, unless by the aid of a magnifying glass. There is pain in the eye, and in the orbit generally; lachrymation and intolerance of light. By and by, the cornea loses its transparency, becoming turbid, and of a bluish-white appearance. The various results of the inflammatory process may then ensue—varying according to its intensity; deposit of plastic lymph, producing thickening and opacity; formation of pus between the corneal layers, afterwards absorbed, or making its way either externally or into the anterior chamber; chronic ulceration, commencing superficially, with mere abrasion, in which case the surface of the cornea is more or less rough, and bears some resemblance to a piece of ground glass, but which appearance, on close inspection, is found to consist of a crowd of minute ulcers; or there may be a large ulcer, originating in the giving way of a pustular formation; lastly, sloughing, either of the whole or

Fig. 35.



Corneitis.

of a part—seldom occurring in the case of simple corneitis alone, but only when this is part of an extensive and severe ophthalmia. If a foreign body be left imbedded in the cornea, it is very evident that inflammation, suppuration, and ulceration must ensue; in obedience to the general law, whereby natural extrusion of foreign matter is effected in all living textures.

In the treatment, general depletion is not often necessary; local abstraction of blood, however, by leeches, is of much service. Counter-irritants, by means of blisters behind the ears, are of use. Purgatives, antimony, and mercury, are the most appropriate remedies for arresting the progress and removing the effects of the disease. But of these, mercury seems to act more beneficially than any other. When a debilitated condition of the system causes protraction of the malady, the eye continuing irritable and intolerant of light, quinine and an improved diet will be required. At first, the local applications should consist of opiate fomentations; but as the disease becomes more chronic, weak stimulants, as vinum opii, or a solution of nitrate of silver (four grains to the ounce) are to be employed.

Strumous Corneitis is of very frequent occurrence in the young; it is more chronic than the simple form; and usually mainly resident in the conjunctival covering. The vascularity is less, and more diffuse; and the zonular arrangement at the corneal margin is less distinctly marked. Opacity is the ordinary result; and pustules, ending in troublesome ulcers, are not uncommon. The treatment is such as is calculated to subdue chronic conjunctivitis; with an especial reference to the depraved state of system. Mild mercurials should be given to check the deposition of opaque matter in the cornea; and, combined with these, quinine is useful to improve the general state of the system. In general, the affection proves of rather an intractable nature.

Aquo-Capsulitis.—This term denotes the inflammatory process resident in the serous membrane of the aqueous humor, including the internal layer of the cornea. It may occur *per se;* or it may form an integral part of the preceding affection. It is characterized by "a pale, deeply-seated opacity, which is unequally distributed, imparting to the cornea a mottled appearance; and by a turbid or cloudy state of the aqueous humor." Sometimes lymph is exuded, and coats the membrane. This disease is very apt to run on to inflammation of the iris. The treatment is as for corneitis, or iritis.

Abscess of the Cornea.

Matter, as we have seen, may form between the layers of the cornea; a result of corneitis. If it collect at the lower part, the accumulation usually assumes a crescentic form; resembling the white semilunar mark at the root of the nail; and hence such an appearance is termed *Onyx.* But it may be deposited elsewhere; in the form of dots or points, which may either remain separate, or may unite with each other by increase and extension. The fluid seems to be purulent. It may, however, be a less advanced inflammatory exudation.

Antiphlogistics will plainly be the most likely means whereby the secretion may be arrested, and its disappearance by absorption favored.

And in order to effect these two indications rapidly, in time to save structure and function, the systemic influence of mercury is highly available—obtained as soon after local bloodletting as possible. Failing absorption, one of three events may occur. The small collection may spontaneously discharge itself internally, into the aqueous humor, forming an hypopion; or it may assume the pustular form, and escape externally, when an ulcer will be the result; or an artificial opening may be made for its external evacuation. In the greater number of cases, the artificial opening is withheld, in the hope that disappearance by absorption may take place; and the frequency with which this result does occur, would lead to a suspicion that the fluid is not truly purulent. If, however, the fluid be of considerable quantity, causing tension in the part, and painful symptoms of an aggravated character, the apex of the abscess may sometimes be touched beneficially, with a fine point of the nitrate of silver. A small slough is thrown off, the matter is discharged, and an ulcer remains, which heals readily. The only application to the eye should be opiate fomentations.

Ulcer of the Cornea.

Ulcers are often the result of corneitis. Their origin may be from without, when the conjunctival covering of the cornea is chiefly affected, and then the commencement is with superficial abrasion, sometimes extensive; or a pustule forms, elevating the conjunctival layer—and on the giving way of this, ulceration follows, still superficial. Or the origin may be from within; matter collects between the true corneal layers, and is discharged externally, leaving an ulcerated aperture; or foreign matter has lodged in the cornea, and is extruded by suppuration and ulceration. In either of these latter cases, the ulcer is deeply seated, and serious.

The ulcer here, as elsewhere, presents different characters, under different circumstances. Sometimes it is acute; the inflammation is still in progress, loss of substance is advancing, and there is no attempt at repair. In this state, the ulcer looks as if a portion of the corneal substance had been dug out mechanically; the edges are abrupt, or they may be thickened and swollen. Very frequently, a distinct plexus of vessels is found leading to the ulcer. The pain, lachrymation, and photophobia are most distressing. Or the ulcer degenerates into the irritable form; the loss of substance growing neither larger nor less; the margins and surface showing an angry and vascular appearance, often as if covered with a layer of wetted chalk; and the symptoms all undergoing intense aggravation. Or the sore may be of a healthy and healing disposition. Then the edges are less abrupt, and as if bevelled off; the chasm is diminishing; a white haziness surrounds the margins, and invests the surface, denoting the deposit of plastic exudation; and the unpleasant symptoms are all very much diminished. Or the ulcer may stop short in the progress towards cicatrization, and assume the indolent character; becoming stationary, and causing comparatively little inconvenience. This last phase, however, is certainly not the one of most frequent occurrence.

In the case of the acute ulcer, it is obvious that the only suitable treatment is antiphlogistic; with mercury given if necessary in small quantity in order to change the perverted condition of the capillaries; and this is to be continued, along with an especial regard to the general health, until the inflammation is subdued, and symptoms of repair succeed those of destruction of texture. Then, in the healing sore, we must content ourselves with watching the natural progress of cure, and carefully guarding against reaccession of inflammation; by exclusion of light and other stimuli, by regulation of diet, and by the use of tepid soothing applications. In the irritable sore nothing is so useful as the nitrate of silver; applied either lightly in substance to the ulcer, or in solution by means of a hair pencil. It acts probably in two ways; by its escharotic power destroying the sentient extremities of the nervous tissue; by its coagulating power forming a protecting film for the raw surface. The application is repeated every second or third day, until the irritability cease; or the interval is shortened or increased as circumstances may seem to require. When either the irritable or inflamed condition threatens to prove obstinate, great benefit often is derived from counter-irritation by blistering behind the ears. For the indolent sore, the various stimulant collyria are suitable. When the strumous habit is strongly declared—as it too often is—little permanent good will be done by any local management, unless constitutional treatment be at the same time duly employed.

As a general rule, the preparations of lead should never be employed as collyria, in the case of ulcer of the cornea. An insoluble chloride of lead will be formed; and this, becoming entangled in the cicatrix, will render it more irremediably opaque than it otherwise would have been. The sustained use of nitrate of silver, also, should be conducted with caution; lest an olive-colored stain ensue.

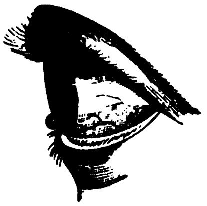
When the ulcer is deep, acute, and situate near the centre of the cornea, there is great risk of perforation of the inner layer, escape of the aqueous humor, and protrusion of the free margin of the iris, to a greater or less extent. To obviate this last accident, as much as possible, belladonna is employed to maintain a dilated state of the pupil; so that the margin of the iris may be retracted, out of harm's way. If, however, the site of ulcer be towards the circumference, the use of belladonna would probably be prejudicial.

Previously to completion of the perforated aperture, the membrane of the aqueous humor sometimes protrudes, in the form of a small transparent vesicle; this condition is termed *Hernia of the Cornea.* It ought to be touched occasionally with a solution of the nitrate of silver, and the iris should be kept fully dilated by belladonna to prevent its being prolapsed, in the event of complete perforation taking place.

Sometimes the perforating ulcer heals only in part; contracts, but does not close; becoming a fistulous aperture, through which the aqueous humor continues to escape. This is remedied by the occasional application of nitrate of silver, finely pointed, to the part; and by a tonic system of treatment constitutionally.

The iris, protruding through the perforated cornea, forms a black

Fig. 36.



Myocephalon.

tumor, usually of no great size; bearing a slight resemblance to the head of a fly; and therefore termed ***Myocephalon.*** Sometimes the iris does not protrude, but simply rests upon the aperture, and closes it up; and in this abnormal position it may become adherent. In either case, the pupil will be deformed; and vision may be seriously impaired. The indications of cure are, to restore the iris to its normal position, and to hasten cicatrization of the aperture. In recent cases, the protrusion, when slight, may be overcome by placing the patient on his back, and applying belladonna; and antiphlogistics are to be employed, to avert or moderate the inflammatory process which is expected to ensue. When, however, protrusion is considerable, the aperture being capacious, immediate replacement is not desirable; temporary and partial protrusion being the salutary means whereby Nature prevents complete escape of the aqueous humor, and consequent collapse of the eye. Under such circumstances, we content ourselves with rest, exclusion of light, supine posture, use of belladonna, and occasional application of the nitrate of silver; thus promoting healing of the sore, removing irritability of the texture involved, and favoring gradual replacement of the iris. In cases in which the displaced portion of the iris has contracted permanent adhesions with the cornea, replacement cannot be effected; removal of the protruded part is had recourse to, either by cutting instruments, or by caustic; and then cicatrization of the remaining sore is attended to.

Opacities of the Cornea.

Nebula is the thin cloudy opacity which follows inflammatory affection of the conjunctival covering of the cornea. It arises from slight structural change remaining in that tissue; and is the form of opacity most likely to be removed, so as to leave the part altogether of its healthy character. The indications of treatment are—to obtain final extinction of any inflammatory excitement which may remain; and, afterwards, to favor disappearance of the structural change by absorption. The former indication is fulfilled by the usual means; the latter, by the guarded use of various stimulant applications. The nitrate of silver, sulphate of zinc, or other substances, may be applied in solution; or fine powders—as calomel, oxide of zinc, alum, &c.—may be blown on the part through a quill; great care being always taken, that this part of the treatment is not overdone, and inflammatory reaccession, with probable extension of the opacity, consequently re-established. In the more obstinate cases, iodine is said to be advisable, both externally and internally. And of late, the local use of hydrocyanic acid has been found of considerable avail. The state of the eyelids should, in all cases, be carefully attended to; for, not unfrequently, a granular condition of the palpebral conjunctiva is the cause of the opacity's continuance, if not of its first formation. The curative process is necessarily gradual; and patient perseverance in the use of remedial means is consequently required.

Albugo denotes the more deeply-seated opacity, which results from plastic exudation between the layers of the cornea. It, too, is amenable to absorption; but not so favorably as the conjunctival deposit. The treatment is conducted on the same principles; but with a certainty of longer perseverance being required, and with a less sanguine expectation of an altogether successful issue. If the changed part be seen traversed by bloodvessels, the prospect of complete cure may be regarded as especially unpromising.

Leucoma is the dense, pearly opacity, which results from cicatrization of a granulating wound or ulcer of the cornea; it is, in short, a corneal cicatrix—thick, opaque, and little amenable to change. Sometimes there is a black point in the otherwise white opacity; denoting entanglement, at that part, of a portion of the iris. Treatment with the hope of discussion, is of little or no avail. Remaining excitement is subdued, and then stimulants employed. But the latter are not used with the hope of altering the cicatrix itself; but only in order to dissipate the nebulous or the albuginous halo, with which the leucoma is usually surrounded. If the opacity be central and small, vision will be greatly improved by habitual dilatation of the pupil by means of belladonna; if it be both central and large, the only hope of amendment is by the formation of an artificial pupil.

It has been proposed to dissect off opacities of the cornea; but obviously success can never follow any such procedure; inasmuch as the loss of substance, caused by the dissection, must heal in the ordinary way, and, so healing, must produce at least an equally opaque and extensive cicatrix. It has been proposed, however, to operate in one class of cases; with a rational and fair prospect of ultimate benefit. The opacity which follows injury of the cornea by sulphuric acid would seem, occasionally at least, to be a chemical incrustation on the cornea, rather than a vital change of and in its structure; sulphoproteic acid is said to be produced, and adheres to the external layer of the cornea; and this may be scraped away, immediately after receipt of the injury, by the edge of a fine knife, leaving the rest of the part clear and free.[1]

In advanced years, and sometimes even in the comparatively young adult, the corneal periphery gradually becomes opaque, and of a gray color. The change has been shown by Mr. Canton to depend on fatty degeneration of the tissue; with a surmise that it may sometimes prove to be an important external indication of similar lesion in more vital parts.[2] The affection is termed *Arcus senilis;* in itself a mere deformity; and not amenable to remedial treatment.

Staphyloma of the Cornea.

Staphyloma of the cornea is an opaque projection of a part, or of the whole of this membrane.

Partial staphyloma is usually situated at the lower or lateral part of the cornea. The iris is adherent to the whole inner surface of the projection, and consequently the anterior chamber is much diminished in size; generally the pupil itself is more or less involved, and vision rendered very imperfect. The affection is caused by an ulcer penetrating the cornea, and allowing the iris to become prolapsed through the opening. When a considerable portion of the iris has protruded, it does not shrink when the inflammation subsides, but remains, and forms a projection at that part of the cornea. After a time the exposed projection of the iris is covered by an opaque firm tissue, of the nature of cicatrix, the edges of which become incorporated at the base with the sound cornea. It is generally the consequence of strumous, catarrhal, or purulent ophthalmia.

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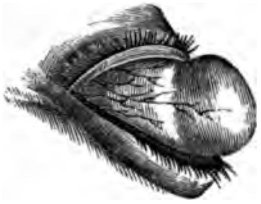
[1] Lancet, No. 1010, p. 537.

[2] Lancet, Jan. 11, 1851.

Fig. 37.



Staphyloma.

Total staphyloma is formed exactly in the same way; it differs only in degree. When, as is often the case in purulent ophthalmia, the whole or greater part of the cornea is destroyed, the iris falls forwards, the pupil closes, and the aqueous humor, accumulating in the posterior chamber, keeps the iris distended in the form of a tumor in the front of the eye. The surface of this tumor, as in the partial staphyloma, becomes gradually covered with a firm opaque cicatrix-like tissue of more or less thickness; and a total staphyloma results. This pseudo-cornea or staphyloma has the form and appearance of a small globe stuck on the front of the eye, with sometimes a ring of the proper cornea surrounding its base. It is often so large as to project considerably from between the eyelids, and prevent them from closing.

When the staphyloma is large, the iris, being unable to expand to the same extent as the pseudo-cornea, is torn and separated from the choroid; and when the staphyloma has been removed, the iris is found in contact with its posterior surface, broken up and in shreds. This does not occur in a small or partial staphyloma. Vision in total staphyloma is completely destroyed.

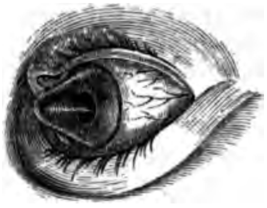
For the treatment of a small partial staphyloma, the less that is done the better; except to guard against any tendency to inflammation. If it be large and implicate the pupil, the projection may be diminished, by touching it from time to time with some caustic—as the caustic potass—in order to produce condensation and contraction; which it does by exciting a slow inflammatory process.

In the total staphyloma, relief is sometimes obtained by puncturing it from time to time with a large cataract needle, and allowing the aqueous humor to escape; when the projection collapses. As the aqueous humor, however, becomes almost invariably reproduced in the same or even greater quantity; and as the staphyloma is a great deformity, besides keeping up a constant state of irritation which is apt to extend to the other eye, its removal should be recommended, so that an artificial eye may be worn. In removing a staphyloma, the eyelids being properly fixed, and a hook passed through the projection in order to command the globe, the base of the tumor is transfixed with a cataract knife from its temporal to the nasal side, a little below its transverse diameter; the knife is then pushed on, and a flap is formed as it cuts itself out. This flap is seized with a pair of beaked forceps, and that part of the base of the staphyloma which remains uncut is divided with curved scissors, and the whole removed. The lens and some of the vitreous humor often escape; but generally sufficient remains to form a good stump for an artificial eye. After the operation, a pledget of lint, soaked in cold water, should be kept applied upon the eyelids, as a preventive of inflammation. If severe reaction supervene, it is to be treated by active antiphlogistics. When bleeding follows the operation, it is checked by cold wet compresses, or by ice applied over the eye.[1]

Conical Cornea.

Sometimes the cornea, "retaining its transparency, gradually assumes a conical or pyramidal form; and when viewed from certain positions, reflects the light so strongly as to exhibit a peculiarly brilliant and sparkling appearance, characteristic of the disease. It generally affects both eyes, though not in an equal degree; has been observed at all periods of life, but more commonly about the age of puberty; and is said to be most prevalent among females."[2] On the whole, it is a rare affection; and fortunately it is so, being but little capable of amendment. If the apex protrude from between the lids, it is liable to become opaque. Or ulceration may take place; and then staphyloma is not unlikely to supervene.

Fig. 38.



Conical Cornea.

In the clear conical cornea, palliation may be obtained by adapting concave spectacles provided with a small central transparency. Lately, it has been said, that amendment, if not cure, has followed perseverance in the use of purgatives and emetics;[3] but how the beneficial result is so obtained, it is not easy to understand or say. When the apex is opaque, temporary amelioration of sight may be secured, by transferring the pupil to a point of the circumference which is as yet clear.

Over-distension of the Cornea.

Simple over-distension of the cornea, by an unwonted accumulation of the aqueous humor, produces both dimness and prominence. If this state be the concomitant of an existing inflammatory process pervading the eye, as corneitis, by subjugation of this the cornea will sometimes be restored. If, on the other hand, the morbid state is not so connected, but of a passive and indolent nature, antiphlogistics will do no good, and are likely to do harm. From the internal use of the iodide of potassium, or—failing this—from a cautiously given alterative course of mercury, more benefit is to be expected; a diminution being thus made in the aqueous humor, on whose plethora the over-distension depends. Repeated evacuation of the aqueous humor, by means of a needle, is often of service.

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[1] *Vide* Wharton Jones's Manual, Am. ed., p. 199, *et seq.*

[2] Littell, p. 188.

[3] Dublin Journal of Medical Science, January, 1844, p. 357.

Affections of the Sclerotic Coat.

Sclerotitis.

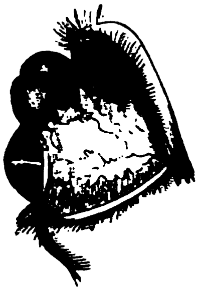
This may occur as part of a general inflammatory process, however excited. Not unfrequently, it exists *per se*, and then almost uniformly is of rheumatic origin; exposure to cold, probably, having proved the exciting cause. It is most frequent in the adult, and about the middle period of life, and is often limited to one eye. Pain is complained of, of a dull, aching kind; increased by pressure, and by movement of the globe; partly resident in the eye, but mainly in the forehead and temple; and marked exacerbation occurs at night. At the commencement of the disease, the eye feels hot and dry; but this state is soon succeeded by an increased secretion of tears. There is, generally, however, little lachrymation or intolerance of light. The minute sclerotic vessels are seen enlarged, radiating in straight lines, to form a vascular plexus or zone of a pink hue, around the circumference of the cornea (Fig. 29); and a narrow white line often encircles the cornea, between that membrane and the pink zone. Not unfrequently, the pupil is contracted, and incapable of its wonted activity of motion; this denotes that the iris has participated in the morbid state. The conjunctiva, too, frequently sympathizes more or less; and by its large, florid, tortuous vessels, the sclerotic characters may be in part obscured. There are often rheumatic pains in other parts of the body.

Antiphlogistic treatment is to be had recourse to; with an activity and continuance proportioned to the intensity of the symptoms. The iris ought to be placed and kept under the influence of belladonna. Mercurial and anodyne frictions should be made on the temple and brow. And the system is to be put under the influence of colchicum, iodide of potassium, guaiac, salines, or other remedies of anti-rheumatic virtue. Cinchona and soda, five grains of each, given three times a day, sometimes cut this disease short when exhibited at its commencement. Counter-irritation, by blisters behind the ears, is also of service. The only local application should be tepid fomentation, either simple or medicated. Occasionally, the affection is found associated with ague; and then a combination of quinine with colchicum is found of much service. Should the iris become involved, the systemic influence of mercury is to be unhesitatingly employed, conjoined with the ordinary antiphlogistic treatment proper for the cure of that affection.

Staphyloma of the Sclerotic.

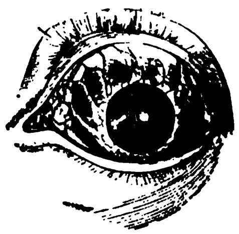
This is much less frequent than staphyloma of the cornea. Generally, it is the result of inflammatory affection of the choroid and change of structure so induced. The sclerotic becomes attenuated, and yielding; the choroid coat, engorged, shines through it; and irregular bulging forwards takes place, constituting several swellings of a bluish or leaden hue. The external vessels are usually enlarged and tortuous. The bulging is often to a great extent; and consequently demands surgical interference. When protrusion takes place from between the lids, then diminution by either puncture or incision is expedient, as in the analogous affection of the cornea. Puncturing the staphylomatous swelling from time to time, and allowing the fluid within to drain off, sometimes diminishes the size of the globe; but if this be not effectual, the humors ought to be discharged through an incision in the cornea; or the cornea itself may be altogether removed, and then the globe will collapse, and the eye shrink to a small size. In the early stage, internal use of the arsenical solution seems to exert a beneficial influence in preventing or checking the bulgings of the sclerotic.

Fig. 39.



Staphyloma of the Sclerotic Coat; seen in profile.

Fig. 40.



The same disease; seen in front. *Staphyloma racemosum.*

Affections of the Choroid Coat.

Choroiditis.

Choroiditis, though a frequent associate of iritis, sometimes evinces an independent existence. It is generally confined to one eye; and is most common in females of a strumous tendency. The early symptoms are often gradual and insidious—because chronic. Muscæ volitantes, and an impaired state of vision, usually first attract the attention of the patient. These slowly increase, and terminate eventually in more or less complete amaurosis.

Sclerotic vascularity is exhibited, in a faint and imperfect degree, at an early period of the disease; it soon becomes aggravated, however, and is generally more distinct at one or two points than at others. It is accompanied with a feeling of tension, and deep-seated pain; often severe, and extending to the surrounding parts; the eyeball is tense and hard to the touch, and by pressure the pain is aggravated; sometimes there is intolerance of light and photopsia.

The sclerotic now becomes attenuated by absorption, assuming a dull blue or leaden hue from the dark choroid shining through it, it also becomes irregularly prominent at certain points. The pupil is dilated, irregular, and of impaired mobility; it is frequently dragged and displaced in the direction of the prominences on the sclerotic; vision is more or less impaired. Ultimately, the whole globe becomes enlarged, and staphyloma of the sclerotic takes place—the thinned coat having been pushed forwards, either by the swelling caused by the enlarged and tortuous vessels of the choroid, or by the exudation which has taken place from them. By the inward pressure, too, the retina has become more and more affected; being pressed towards the centre of the eye, where occasionally it may be seen through the pupil, in the form of a glistening or whitish cord; loss of vision is at length complete. General internal ophthalmia is not unlikely to supervene.

Treatment should consist in the abstraction of blood both generally and locally, but more particularly in the latter way; in the early stage of the disease, the extreme vascularity of the choroid being more decidedly influenced by abstraction of blood than by almost any other remedy. In the subacute form, blood is to be withdrawn with more caution; and, in both forms of the disease, counter-irritation is of good service. Purgatives also are useful. Mercury, given so as slightly to affect the system, seems in many cases to arrest the untoward progress; but when the malady is connected with a strumous habit, it requires to be given with great caution, and generally should be combined with quinine, iron, iodine, and the like. In such cases, nutritious diet, good air, and exercise are also beneficial. The arseniate of potash given in small doses, three times a day, has often proved beneficial in the advanced stage, when other remedies have failed. If staphyloma of the sclerotic have occurred, puncture or incision may become necessary, as already explained.

Muscæ Volitantes.

Weak vision, rendered imperfect and interrupted by opaque bodies seeming to float before the eye, is generally understood to depend on congestion of the choroid coat. The ordinary cause is over-exertion of the organ, combined with sedentary habits; it is also often symptomatic of derangement of the stomach. The remedial treatment consists of moderate depletion from the neighborhood of the part, gentle purging, alteratives, careful diet, repose of the organ, bodily exercise, and ultimately tonics.

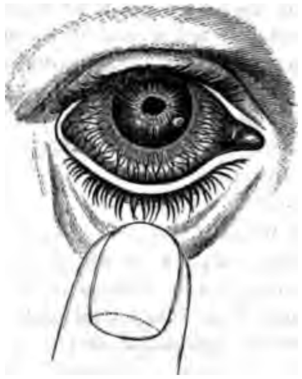
Affections of the Iris.

Iritis.

Inflammatory affection of the iris may be the result of injury, or it may be of idiopathic origin; it may occur primarily, itself constituting a disease, or it may be but a part of general deep ophthalmia; it is often connected with the syphilitic, and mercurio-syphilitic taints of system; and not unfrequently it is of a rheumatic character.

A pink or brick-red vascular zone is seen on the sclerotic, formed by the minute subdivisions of the anterior ciliary arteries. This zone is most distinct near the edge of the cornea, and becomes gradually shaded off towards the circumference of the globe; it is more or less marked according to the extent and stage of the inflammatory process. There is at first a distinct interspace of white, between the vascular zone and the corneal margin; ultimately this white line becomes obscured by involvement of the conjunctival vessels. The pupil is contracted, and much less movable than in health, under the ordinary stimulus of light. Indeed, returning mobility of this part is one of the first and surest signs of amendment having fairly begun.[1] The iris changes its hue; if of a light color naturally, it becomes greenish; if dark, it assumes a reddish-brown appearance. It is also perceptibly swollen, or thickened at its pupillary margin; sometimes it is seen of increased vascularity, and bulging forwards in the anterior chamber. The eye is painful, intolerant of light, and there is increased lachrymation; pain is felt in the brow, temple, and head, and undergoes marked nocturnal exacerbation. Sight is greatly impaired.

Fig. 41.



Iritis; showing the characteristic vascularity of the globe, the iris clogged with lymph, the pupil contracted and irregular.

As the disease advances, these symptoms increase. The aqueous humor becomes turbid. Plastic deposition takes place from the surface of the iris; sometimes coating it with a thin layer, sometimes studding it with nodulated points; sometimes diffused in the anterior chamber; often and most frequently situate at the free margin of the iris, hanging pendulous in fringes from the circumference, forming a delicate network stretched across, or perhaps completely blocking the already contracted pupil. And at this stage, if not before, the contracted pupil is found to be irregular in form, in consequence of adhesions having taken place between it and the capsule of the lens; an irregularity which becomes especially distinct, when partial dilatation has been effected by belladonna. Extravasation of blood from the surface of the iris may occur; small clots are sometimes to be seen resting on it; or the blood may gravitate to the bottom of the anterior chamber, and accumulate there, constituting the state termed *Hypocæma*. Or effusion of pus into either chamber may take place. The pus forms small abscesses on the iris, which soon give way and discharge their contents; and, gravitating to the bottom of the anterior chamber, it collects there, constituting

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[1] Gromelli, from the observation of successful injection, concludes the iris to be an erectile tissue. He supposes that the contraction of the pupil during the inflammatory process depends simply on engorgement of the radiating vessels, which are fixed at the circumference, and free at the pupillary margin; and that return of the blood, in resolution, allows the iris to shrink, and the pupil consequently to expand.—*Brit. and For. Rev.* No. 29, p. 233.

[In regard to this question, Dr. Sargent, in the 3d edition, quotes from the paper of Mr. Lister, in the first number of the *Quarterly Journ. of Microscopical Science*, by which it is shown that a distinct sphincter and also a dilator of unstriped muscular tissue may be recognized in the iris.]

Hypopion. Such events indicate an intense inflammation; not only likely to prove most prejudicial to the delicate texture involved, but also almost certain to extend to those adjoining.

The result of fibrinous exudation is denoted by various terms, according to its extent and site. When fibrine blocks up the pupil permanently, the case is termed one of *False Cataract.* When adhesion has formed between the posterior surface of the iris and the capsule of the lens, it is termed *Synechia posterior.* When the iris, bulging forwards, has reached the posterior layer of the cornea, and become adherent thereto, the term *Synechia anterior* is applied. After a time, the vascularity of the organized fibrine can often be distinctly seen, when a strong light is thrown upon the part.

During active advance of the inflammatory process the system sympathizes to a considerable extent; there is often a marked form of inflammatory fever.

Treatment.—Our principal object is to arrest the progress of the disease at an early period, ere exudation or structural change has taken place, in order to avert all hazard to the important part, if possible. Our remedies ought to be early, active, and powerful. Blood should be abstracted freely, both generally and locally. The eye is kept dark or shaded, and should be frequently fomented. The bowels are freely moved; and then, as rapidly as possible, the system is brought under the full influence of mercury—unless there be some pre-existing and undeniable contra-indication; for in general it is not till the mouth is affected mercurially, that the disease begins to amend. If the system, however, be strumous, and consequently intolerant of mercury; or when there is a known idiosyncrasy rendering all exhibition of the mineral dangerous by the induction of erethismus:—then a substitute must be sought, likely to aid general antiphlogistics in preventing exudation, or in causing its absorption. Turpentine is often a valuable remedy for this purpose when given in full and continued doses;[1] but it is not always to be trusted to alone; it seems to act better when a small quantity of mercury has been previously given, and then its use frequently proves beneficial, not only at the time, but also in preventing relapse of the disease. From the first, belladonna is applied, so as to oppose the tendency to contraction in the pupil, and effect dilatation if possible. The semi-fluid extract is smeared on the eyebrow and temple, or an aqueous solution may be dropped between the eyelids; but the former method of application is usually preferred, at least in the first instance. In those cases in which mercury is not contra-indicated, mercurial friction on the temple and forehead is advisable, to maintain the constitutional effect which internal exhibition of the mineral has produced. In the more chronic form of the disease, counter-irritation may take the place of the direct antiphlogistics. And, ultimately, when traces of the affection still linger, the internal administration of tonics, especially of quinine, proves beneficial by dissipating the state of passive congestion which threatens to remain.

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[1] Mr. Carmichael's Formula is as follows:—Recipe—Ol. Terebinth. rect. unc. unam—Vitel. unius ovi—Tere simul, et adde gradatim. Emuls. Amygd. unc. quatuor—Syrup. cort. aurantii unc. duos—Spir. Lavend. comp. drachmam, c. semisse—Olei Cinnamomi, guttas quatuor. M. ——— Dosis—unc. un. ter. in die.

When Hypopion has formed radidly, and when the purulent accumulation is considerable, it has been proposed to make an opening at the lower part of the cornea, by means of a cataract knife, so as to effect evacuation. This, however, is dangerous; it is better to trust to the sorbefacient powers of mercury, than to encounter the risk of aggravated inflammation.

The extravasated blood of Hypoæma should receive the same treatment. Active antiphlogistics are had recourse to; and these having told favorably on the disease, the extravasated blood may be expected to disappear gradually by absorption. The occurrence of Hypoæma, however, as indicating a high degree of inflammation, is always of bad omen.

The adhesions, or *Synechiæ*, are superable in the recent state. By perseverance in the local use of belladonna, the imperfectly organized fibrine is extended or torn, and the iris recovers its normal play. At the same time, absorption of the deposit is to be favored, by moderate continuance of the mercurial friction.

Syphilitic Iritis is a frequent variety of the affection, occurring as part of the secondary train of venereal symptoms. Its characteristics are:—the accession along with other venereal symptoms; marked nocturnal exacerbations; a dark hue of the vascular zone; fibrinous deposit occurring in nodules of a brownish hue, studded on the margin of the pupil as well as on the surface of the iris; and the margin of the pupil often observed to be thickened, and corrugated. This form generally is more severe, and runs its course more quickly, than the idiopathic variety of iritis. Treatment is as for ordinary examples of the disease.

The *Rheumatic and Arthritic Iritis* is not of such frequent occurrence. It is characterized by:—accession taking place along with other symptoms of a rheumatic or gouty character; the vascular zone is of a purplish hue, and not a little obscured by early involvement of the conjunctival vessels; the whitish ring surrounding the cornea is more perceptible in this species of iritis, than in any other; the pupil, contracting, inclines to assume an oval form; and there is peculiar proneness to relapse. Treatment consists of the ordinary antiphlogistic remedies directed against acute and inflammatory rheumatism. Mercury should be given cautiously, and often requires to be combined with quinine as a tonic; in many cases its place may be advantageously taken by colchicum, guaiac, or iodide of potassium.

Strumous Iritis frequently results from extension of the inflammatory process inwards, in cases of strumous corneitis, and is the form of iritis most generally met with in childhood. The previously existing opacity of the cornea is very liable to mask the internal and more important disease; deceiving the practitioner as to its existence, until the opportunity for successful treatment has passed. Mercury should be used very sparingly; and, at a comparatively early period, the administration of quinine, iron, iodine, &c., with a tonic regimen, is required.

Changes in the Pupil and Iris.

Unusual dilatation of the pupil is termed *Mydriasis.* It may be of idiopathic origin; or it may be connected with disorder in the cerebral functions; it is a common symptom of Amaurosis; and frequently it is caused by contusions; often it is sympathetic of intestinal irritation. The admission of an excess of light to the retina is found to be a serious inconvenience; and vision is confused and impaired accordingly. The remedial treatment consists in detection of the cause; removal of this, if possible; and subsequent stimulation of the part, by frictions on the temple and brow, and by exposure of the eye itself to ammoniacal vapor. Electricity and galvanism are also sometimes useful. In the idiopathic forms of paralysis of the iris, M. Serres recommends cauterization of the corneal margin by nitrate of silver. In other cases, palliation results from contracting the space for admission of light, by spectacles darkened except at a small opening in the centre, as in the case of conical cornea.

When dilatation of the pupil accompanies amaurosis, of course it cannot be expected to disappear, unless the amaurotic condition have been previously removed.

Myosis denotes unusual contraction of the pupil. This is one of the consequences of Iritis, as we have already seen; it may also attend on disorder of the cerebral functions; sometimes it is induced by habitual straining of the eye on small objects—as in microscopists, engravers, watchmakers, &c. Ordinary and useful vision is necessarily impaired. The means of cure consist in removal of the cause. In the artificers just enumerated, temporary abstinence from the usual avocations will often suffice to restore the normal state.

Tremulous Iris.—A trembling, or oscillatory movement of the iris, not unfrequently accompanies amaurotic affections; and seems also, in most cases, to be connected with softening of the vitreous humor. It is but little amenable to treatment; and is chiefly notable as a sufficient contra-indication of operative interference, in connection with cataract and artificial pupil.

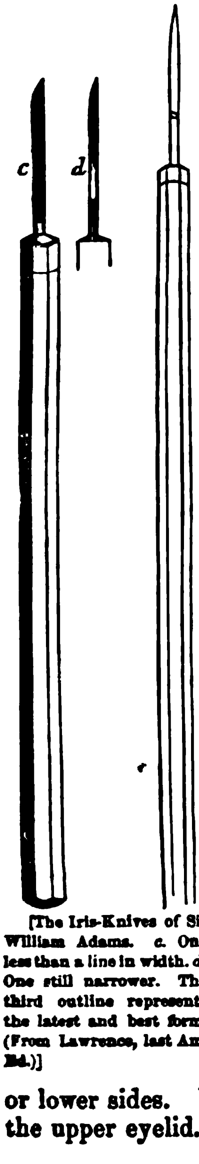
Adhesions of the Iris—Synechiæ—have been already considered. They may be the result of wound, of corneitis, or of iritis. In synechia anterior, complete, and accompanied with opaque cornea, cure is manifestly hopeless. When incomplete, and the cornea clear, amendment by the formation of an artificial pupil is within our power. When the adhesion is partial and recent, it may sometimes be remedied by mercurials, and the use of belladonna. Similar treatment will avail in synechia posterior, when recent and partial. But, when complete, it is usually accompanied with opacity of the crystalline capsule, and it may be of the lens itself; under such circumstances, amendment of vision can be effected only by an operation directed against the cataract.

Occlusion of the Pupil.

The pupil may be closed in various ways. Remaining itself in a normal state, it may be obscured by the cornea which has become simply opaque, or opaque and staphylomatous. Or, the cornea remaining clear, the iris may contract during inflammation, and the pupil may become occupied by organized fibrinous deposit. Or both iris and cornea may undergo serious structural change; as when complete synechia anterior takes place in staphyloma. In the last-mentioned case, restoration of sight is manifestly impossible. But in the other examples, something may be done by forming an *Artificial Pupil.*

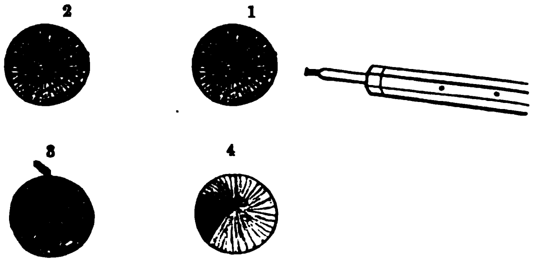
Before proceeding to any such operation, however, certain circumstances are invariably to be taken into consideration. It must be ascertained :—that the adhesions of the iris are irremediable by the influence of mercury and belladonna; that the opacity of the cornea is permanent; that the other parts of the visual apparatus—especially the retina and vitreous humor—are in a sound and healthy condition; that the eye has not only ceased to be the seat of all inflammatory affection, but, also, that it is not prone to resume this on the application of a fresh exciting cause. An operation is also very properly held to be inexpedient, so long as the patient enjoys a tolerable degree of vision with the other eye; and it is plainly contra-indicated, when one eye only is affected.

Fig. 42.



[The Iris-Knives of Sir William Adams. *c.* One less than a line in width. *d.* One still narrower. The third outline represents the latest and best form. (From Lawrence, last Am. Ed.)]

Fig. 43.

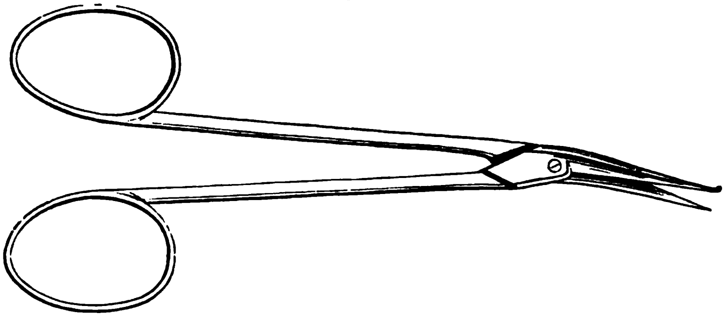


1. Coretomia through the sclerotic. The knife introduced—rather far back. 2. Coretomia through the cornea, showing the lines of the incision. 3. The same, after the operation. 4. Coredialysis, or separation. (From Wharton Jones.)

Three distinct modes of operation are practised; all implying division of the iris—so as to make a sufficient gap in it—opposite a clear portion of the cornea. The desired space in the iris may be obtained by incision, excision, or laceration. Accordingly, the operation is said to be by Coretomia, Corectomia, or Coredialysis.

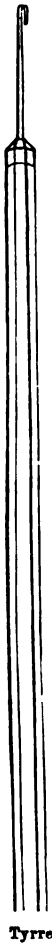
The situation of the proposed new pupil requires consideration. The centre of the iris is the best position; but when this is impracticable from central opacity of the cornea or other cause, the nasal side is to be preferred; or it may be made on the temporal or lower sides. When made above the centre, it is apt to be covered by the upper eyelid.

Fig. 44.



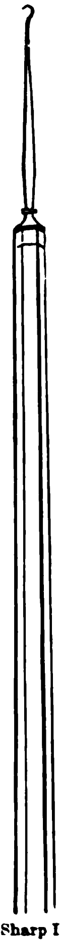
[Maunoir's Scissors; so delicate that the thickness of the two blades united does not exceed that of an ordinary probe. (From Lawrence.)]

Fig. 45.



Tyrrell's Blunt Iris-Hook.

Fig. 48.

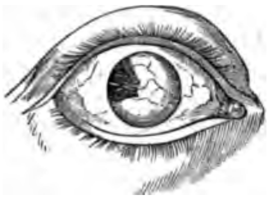


[Sharp Iris-hook. (From Lawrence.)]

The patient, by previous preparation, should be placed in a condition favorable to the avoidance of inflammation.

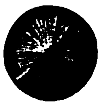
Coretomia, or incision, is performed in cases where the greater portion of the cornea is clear, and the iris is apparently in a state of tension, with the pupil closed. It may be performed either through the sclerotic, or through the cornea. In operating through the sclerotic, an iris-knife is introduced through this membrane about a line from its junction with the cornea, as in the operation for cataract, and the point of the knife is made to pierce the iris at about a line from its temporal margin; the instrument is then carried across the front of the iris in the anterior chamber, to the nasal side of the cornea (Fig. 43, 1); and, while it is withdrawn again, gentle pressure should be made with its edge upon the iris, the tense fibres of which when divided will separate, and an elliptical or ovoid pupil will be the result. The fibres of the iris should be divided for about a half of the diameter of the membrane. When the lens is opaque, as is generally the case, it should be broken up at the same time.

Fig. 46.



Extensive Opacity of the Cornea. A portion left clear, suitable for an artificial opening in the iris, by corectomia.

Fig. 47.



Corectomia.

In operating through the cornea, a method practised by Maunoir, an opening is made in this membrane by a cataract-knife, involving about a third of its circumference; into this aperture a pair of fine scissors is introduced, the pointed blade of which is thrust through the iris, while the blunt one is carried between that membrane and the cornea. The scissors are pushed on, till their farther progress is arrested by the junction of the cornea with the sclerotic, when their blades are brought together, and the iris is divided as in the former instance. Or, another incision may be made with them, diverging from the first, and including a triangular portion, the apex of which is near the centre of the iris. The flap so formed will shrivel up in the direction of its base, and leave a sufficient opening for the admission of light (Fig. 43, 2 and 3).

Corectomia, or excision, is performed through the cornea, in cases where a portion of that membrane is opaque. When the pupil is non-adherent, and only the centre of the cornea opaque, a broad flat needle, or the point of a cataract-knife, is passed into the anterior chamber at the lower or outer side of the cornea; through this aperture Mr. Tyrrell's fine blunt hook is introduced, and having been entangled over the free margin of the pupil, is withdrawn through the opening; the included portion of iris being either excised with scissors, or allowed to rub off with the friction of the lids, after having become strangulated in the wound of the cornea.

When the pupil is adherent either to the capsule of the lens, or to the cornea, a larger incision than in the former case should be made, near the junction of the cornea with the sclerotic, and through a clear portion of the cornea. The aqueous humor escapes, and is generally followed by a protrusion of the iris, which should be increased by gentle pressure on the globe; or a portion of it may be dragged out of the opening by a small hook; and when a sufficiency has been protruded, it should be excised with the curved scissors. Sometimes it is necessary to separate the adhesions with a needle, before the iris will prolapse. A portion of the pupillary margin should, if possible, be included in the excised part.

Coredialysis, or separation, is performed when the cornea is opaque, except a small part at its circumference. Having made an opening about two lines in length through the opaque membrane, a fine sharp hook is introduced, which is fixed in the iris close to its ciliary border, and behind the clear portion of the cornea. When the hook is withdrawn, the iris is torn away from its ciliary attachment till an opening of sufficient size is obtained (Fig. 43, 4). The portion of the iris which is drawn out of the anterior chamber, may either be allowed to become strangulated in the edges of the incision, or may be excised.

This operation may also be performed by introducing a curved cataract-needle through the sclerotic, and carrying it across the posterior chamber till it reaches that portion of the iris which it is wished to separate from its ciliary attachment; here it is made to perforate the iris, and separation is effected by pressing the point downwards and outwards.

There is generally a considerable quantity of blood effused into the anterior chamber after all of these operations, and more or less inflammatory affection follows. Strict antiphlogistic treatment should be pursued, with confinement in a dark room. It is to be remembered that the new pupil on its first formation, should seem rather too large than otherwise; there being always a decided tendency to subsequent contraction.

Affections of the Retina.

Retinitis.

The acute form of this affection may follow direct injury by wound, or the pressure of a depressed lens, or exposure to intense light or heat, or undue and continued exertion of the eye; or it may be of idiopathic origin. It is accompanied with agonizing pain, deep-seated, shooting through the head, aggravated by the slightest motion, and often with delirium. There is very great intolerance of light, with lachrymation; luminous bodies seem to pass before the eyes; vision is greatly impaired from the commencement; the pupil is at first much contracted, but afterwards becomes dilated, and remains motionless. Then the intolerance of light abates, and blindness becomes complete—the retina being no longer capable of obeying the accustomed stimulus. The system is involved in marked inflammatory fever. At first, the outward indications of increased vascularity are not very apparent; but, ultimately, as the affection extends to the other deep textures of the eye, the usual signs of internal ophthalmia become developed.

Treatment, which should be decidedly antiphlogistic, consists in seclusion from all stimulus of both the eye and the system; bleeding, both local and general, repeated if need be; purgatives; counter-irritants; and free exhibition of mercury so as to exert its full influence on the system. Mere abatement of the acute symptoms is not sufficient; therefore, the remedies ought to be persisted in, till a perfect cure is established; due regard being paid to the safety of the patient. If the disease be allowed to degenerate into a chronic form, it will ultimately prove injurious to the function of sight.

Amaurosis.

By this term is understood impairment of vision, more or less complete, dependent on change in the retina, optic nerve, or brain; and that change may be either structural or functional. In the latter case, there is good hope of cure by suitable treatment; in the former, even palliation is often hardly within our power.

The causes are:—change in the retina, optic nerve, or brain, by the inflammatory process, acute or chronic; compression of these parts in any way—as by extravasated blood, inflammatory effusion, or formation of a tumor; a congested state of these parts induced by over exertion of the eye or brain, by irregularity of bowels, by habitual exposure to much light and heat, by intemperance, by gout—by, in short, whatever tends to cause determination of blood to the head. Sometimes, on the contrary, amaurosis is caused by want of the circulating fluid in the eye or in the head; as in cases of anæmia from prolonged lactation, profuse uterine discharge, or the like. Wounds of the supraorbital branches of the fifth nerve have often been followed by amaurosis.

The symptoms are:—impairment of vision, gradual and increasing; at first there is perhaps mere obscuration of sight, but this soon gives place to thorough perversion of that function; objects are often seen of erroneous proportion and color. In the congestive and inflammatory forms, more or less pain is complained of. At first, there may be intolerance of light; but ultimately a glare is borne with impunity, or is rather desired than otherwise. Ocular spectra are seen, either constantly, or from time to time, especially after exertion of the eye; they may be dark or luminous, massy or scintillated, steady or flickering. The pupil is dilated; the iris is sluggish, and ultimately motionless; the eye has a vacant staring expression; and the patient acquires a peculiar, uncertain gait. Often there is no fixed or decided pain in the part; but rather a sensation of tension and uneasiness. Sometimes the eyeball has a tremulous or oscillatory motion. On the whole, the ordinary and characteristic symptoms are, the painful sensations, the impairment and perversion of vision, the ocular spectra, and the state of the pupil. In applying the catoptrical test, the three images of the candle are seen as in the healthy eye—a sufficient distinction from both glaucoma and cataract. From the latter it is further distinguished by vision being improved in strong light, and impaired by belladonna; by the state of the pupil; by the absence of crystalline opacity; by perversion of sight existing—not mere impairment; and by the characteristic stare and gait of the patient.

But there is no uniformity as to symptoms. In most examples, pain ceases on full establishment of the disease; in others it continues unabated. In most, the symptoms gradually advance to complete loss of sight; in others, independently of treatment, the symptoms reach a certain point and then remain stationary. One patient may continue to have intolerance of light throughout; the majority of advanced Amaurotics, on the contrary, seek a strong light, finding their vision improved thereby. Some see objects double; this variety is called *Diplopia*. Others see but half of an object; and this is termed *Hemiopia*. In many, the pupil is at first contracted, there being an originating inflammatory process present; in most, ultimate and permanent dilatation exists; but, in a few cases, the iris seems natural in both form and hue, and is perfectly obedient to the stimulus of light.

The untoward progress is very various. Sometimes vision is lost at once, as when extravasation takes place by sudden congestion. Sometimes months elapse; or even years may be occupied in the gradual decay. The affection is most common in the middle period of life; and while it seldom attacks both eyes at once, both are ultimately involved in the great majority of cases.

In the inflammatory form, the mode of treatment is plain; the ordinary antiphlogistics are demanded, in cases which are at all acute; and the system ought to be brought, and maintained for some time, under the influence of mercury, which often evinces a striking control over the disease. In the chronic examples, moderate depletion, followed by an alterative course of mercury, is most likely to prove useful; and counter-irritation is at the same time advisable. When congestion is suspected, moderate depletion should be practised with purgation; and then the ordinary means are to be taken for preventing local determination of blood. If the affection have followed disappearance of an accustomed discharge, normal or not, return of that discharge is to be sought. If an atonic state of the system exist, a stimulating plan of constitutional treatment is plainly indicated. If the disease be apparently but a secondary symptom, as it were, of some constitutional malady—as jaundice or hysteria—that malady is to be thoroughly eradicated from the system, if possible. If intestinal irritation exists, or be suspected, it is to be treated by the ordinary means. In short, the predisposing and exciting causes should, if possible, be ascertained and removed. And this paramount indication having been more or less perfectly fulfilled, certain means are sometimes in our power whereby to rouse the retina to a resumption of its function. Stimulants, when applied directly to the eye, or to its neighborhood, are sometimes useful for this purpose; or the endermic application of strychnia may be made on the temple or forehead. A blister having been applied, a quarter of a grain of the powder is sprinkled on the part, once or twice a day. The dose is gradually increased, until a bitter taste is felt in the mouth; and then temporary discontinuance of the remedy is expedient. Failing strychnia, electricity may be employed, but its use is seldom attended with much benefit.

Affections of the Crystalline Lens and Capsule.

Cataract.

The term *Cataract* is applied to opacity of the crystalline lens. It is said to be *lenticular*, when the disease is situated in the lens itself; *capsular*, when the capsule only is opaque; and *capsulo-lenticular*, when both the lens and its capsule are affected. The affection may occur at any age, and is said to be owing to "defective nutrition from the changes which are going on in the vascular or lymphatic system." Or it may be induced by external injury of the part. Sometimes it is a congenital defect. Most frequently it occurs in advanced years; one sign, among many, of the frame's gradual decay.

The prominent symptom is impairment of vision. At first, objects are seen as if obscured by a gauze or mist; this obscuration gradually increases; and ultimately vision is almost, but not entirely, lost. Sometimes uneasy sensations are complained of in the eye and forehead; more frequently the part is the seat of no abnormal sensation. Sight is improved by a diminution of light; it is better at twilight than at noon, and also better when the patient is seated with his back to the light, than when facing the window; for the pupil, then dilating, permits the rays of light to pass to the retina through the margin of the lens, which is as yet unobscured. For a like reason, the use of belladonna materially improves the sight. On looking into the eye, an opacity is discernible, occupying the pupil, and situate immediately behind it. Whenever deliberate examination is contemplated, belladonna should be previously applied, to dilate the pupil, so as to afford every facility for ascertaining the extent and character of the opacity. In proportion as sight is impaired, the opacity is found to have increased. It is greatest at the centre; when complete, it is of a gray, white, bluish, or amber hue; and this is not unfrequently contrasted with a dark annulus or ring on its exterior—the shadow of the iris falling on the periphery of the cataract. In the most advanced cases, the patient is still able to distinguish light from darkness. The iris is not necessarily impaired in its functions. Both eyes are seldom attacked at once; but usually both are ultimately involved.

What is termed the *catoptrical test* of cataract is conducted thus. The pupil having been dilated by belladonna, the patient is seated with his back to the light, and the surgeon holds a lighted taper in front of the eye. In a sound organ, the depth of the clear pupil exhibits three reflections, or images, of the light; one superficial, bright, and distinct, caused by reflection from the cornea; one deep-seated, pale, and indistinct, caused by reflection from the anterior portion of the lens; and one in the mesial plane, or between the two former, small and obscure, caused by reflection from the posterior portion of the lens; the two first, erect, move consentaneously with the lighted taper; the last mentioned, inverted, moves slowly and in an opposite direction. In the case of cataract, the middle inverted image is first extinguished; and afterwards the deep erect one also becomes invisible. Or, to speak more accurately, "opacity of the posterior capsule prevents the production of the middle inverted image; and opacity of the anterior capsule destroys the two posterior ones. In other words, in posterior capsular cataract, the middle or inverted image is not seen; in cataract of the anterior capsule, and in capsulo-lenticular cataract, the anterior straight one only is visible." In amaurosis, the three images are always distinct, as in the sound eye. "Glaucoma, only when much advanced, obliterates the inverted image; while, in all its stages, it renders the deep erect one more evident than it is in the healthy eye."

From glaucoma and amaurosis cataract is further distinguished, by the state of the pupil, the site and character of the opacity, the nature of the vision, and the expression and gait of the patient.

Spurious Cataract is said to exist, when organized fibrine occupies the pupil. This is distinguished from true cataract by being of a yellow or whitish color; and by the lens being adherent to the iris, which is puckered, altered in hue, and irregular in its pupillary margin.

Cataracts vary as to density. Hard cataract is most frequent in the old; and is characterized by its brownish or amber tint. The lens is apparently shrunk in its dimensions, and the greatest amount of opacity is central. The iris is free and movable; the dark ring surrounding the cataract is remarkably distinct; and in the twilight, as also after the use of belladonna, objects may often be discerned with tolerable accuracy. *Soft* cataract, of fluid or semifluid consistency, is large and bulging, and completely occupies the pupil. It is most common in the young and middle-aged, and is characterized by its bluish-white or milky color. The iris is clogged in its movements, from the increased size of the lens; and the impairment of vision is great. The opacity is not always homogeneous; dots or streaks are occasionally observed on it; and these may change their form and site from time to time. In what is termed the *Radiated* Cataract, the opacity is formed in streaks; and not unfrequently commences at the circumference, thence extending towards the centre. This peculiarity is readily observed on inspection; and, as can be easily understood, vision will for some time prove better with a contracted than with a dilated pupil.

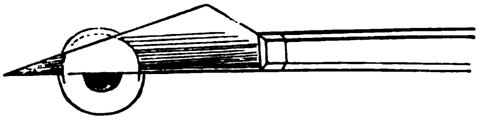
Treatment.—Unfortunately our art has as yet proved impotent, in attempting to stay the progress of advancing cataract; and, when it has fairly formed, no faith need be reposed in any attempts at simple discussion of the opaque structure. By operation only can amendment be obtained. The obstructing body may be wholly extracted from the eye; or it may be pushed out of the axis of vision; or it may be broken up into fragments, which are expected to be afterwards absorbed; or it may be simply drilled; or it may have its capsule opened, so as to admit the aqueous humor, and thus favor absorption of the crystalline substance. Before any operation, however, is undertaken, certain preliminaries require to be adjusted, as in the case of Artificial Pupil. We must first be satisfied that the eye is in other respects sound; so that, when the obstruction to light is removed, there may be a fair prospect of vision being restored. There must be no amaurosis, glaucoma, change in the vitreous humor, ophthalmia, or affection of the eyelids. The patient must be free from any marked constitutional ailment. The state of the atmosphere should be mild and favorable. While there is a tolerably useful amount of vision enjoyed by either eye, it is more prudent to refrain from operation; the results of operation being found most favorable in cases well matured. One eye only should be operated on at a time. Finally, by careful regimen, and medical treatment if necessary, the system is brought into a favorable state, and is rendered not morbidly susceptible of inflammation.

In the congenital variety an operation should be performed early; otherwise the unsteady rolling motion which the eyeball is so prone to assume, will prove an impediment to subsequent interference, and to the successful result of operation.

Extraction.—In the operation by extraction, the opaque lens is removed from the eye through an aperture in the cornea—an operation, necessarily comprehending a considerable extent of wound, and no slight amount of injury done to the parts. If inflammation can be prevented, the result is often most successful. But if inflammation supervene, or an accident happen to the vitreous humor during the operation, sight is lost irretrievably. Many favorable circumstances require to be present to warrant an attempt at extraction. The cornea should be sound, the anterior chamber of proper size, the iris mobile and non-adherent, the globe prominent and steady, the cataract lenticular and hard. The patient should be in good health; neither plethoric and inflammatory, nor weak and incapable of plastic exudation; capable of self-control, and of maintaining the supine posture; not troubled with cough, sneezing, or asthmatic ailments. And this series of qualifications necessarily limits the operation by extraction to a minority of the cases of cataract.

The pupil should not be dilated, otherwise escape of the vitreous humor is favored. The patient is placed before a steady light, but with his head slightly inclined from it, and either seated, or recumbent; the sound eye may be covered by a bandage. The surgeon, holding the knife in his right hand, should be placed either in front or behind, according to the eye which is to be operated on. An assistant now opens one lid with his fore and middle fingers, at the same time steadying the eyeball by a little gentle pressure; the surgeon opens the other eyelid, and assists in steadying the globe, by the fingers of his left hand. If the patient sits, his head is secured against the lower part of the assistant's chest. The flap may be made superiorly or inferiorly, according as it is the right or left eye which is to be operated on. It is usually made superiorly when it is the right eye, the surgeon standing behind, and elevating the upper lid himself; when it is the left eye, the flap is made inferiorly, the surgeon being seated before his patient, and depressing the lower lid, while the assistant raises the upper.

Fig. 49.



Extraction. The knife cutting through.

The knife used is the triangular one, known as Beer's. It should be held lightly between the thumb and points of the fore and middle fingers, the ring and little fingers resting upon the cheek. The flat edge of the point is first made to touch the cornea gently, in order to reassure the patient, and secure steadiness of the organ; it is then entered at about a line from the corneal margin, and passed into the anterior chamber in a perpendicular direction, lest separation of the corneal laminæ should take place from the knife getting between them. Penetration having been effected, the direction is changed, and made parallel to the surface of the iris; the knife is then pushed steadily across the anterior chamber, the point emerging at a spot directly corresponding to that of its entrance; and the steady advance of the instrument is continued, until section of the cornea is complete. All pressure is now to be removed from the eyeball. If the aqueous humor escape prematurely, the iris falls forward, and is consequently brought into contact with the edge of the knife. In this case a stop is made, and gentle pressure must be applied to the cornea yet uncut, without however withdrawing the knife. This may succeed in replacing the iris, and then section is continued. If not, the knife is withdrawn, and probe-pointed scissors are substituted, with which the wound is finished.[1]

The corneal section having been completed, the eyelids are permitted to close, the eye to rest, and the pupil to dilate. Then, the lids having been gently re-opened, the sharp end of a curette is cautiously introduced beneath the flap, and as gently as possible made to divide the capsule. The slightest possible pressure is then made on the upper eyelid—over the anterior part of the globe, just behind the corneal margin—so as to dislodge the lens—and nothing more. On escape of the opaque body, the corneal flap is properly adjusted, and the eyelids are permitted finally to close. Should the iris have prolapsed, sudden exposure to a bright light will probably suffice for its reduction, by causing contraction of the tissue; if not, the protruded portion may be replaced by gentle use of the blunt extremity of the curette. The eye is covered with a light pledget of lint, and a bandage. The patient should be laid on his back, with the head elevated; light and all other stimuli are to be rigidly excluded; the most sparing regimen is to be enjoined, the act of mastication even being interdicted; precautions are to be taken against coughing, vomiting, and sneezing; and, if need be,

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[1] Or, according to the method of Sichel and others, the operation may be interrupted, and postponed till the humor is reproduced.

Fig. 50.

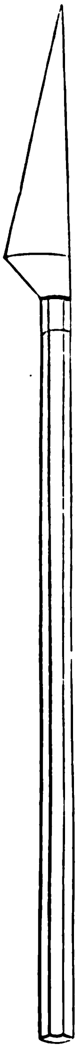


Fig. 51.

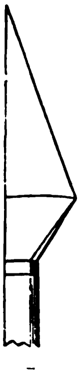


Fig. 52.

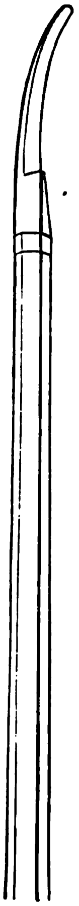


Fig. 53.

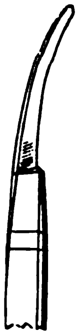
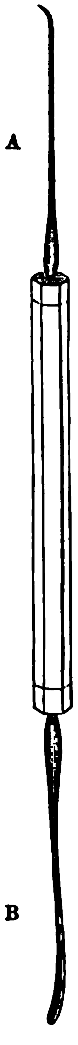


Fig. 54.



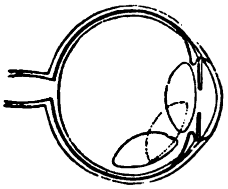
[Fig. 50. Beer's Knife. Fig. 51. Mr. Tyrrell's Knife—a shorter blade. (From Lawrence.)]

[Figs. 52 and 53. Curved Knives for extending the incision in the cornea. (From Lawrence.)]

[Fig 54. The Curette, a narrow, sharp-pointed, and slightly curved steel instrument; at the other end of the handle, Daviell's Scoop, or Spoon, a small silver instrument, sometimes used to remove the lens, if it do not readily engage in the opening. (From Lawrence.)]

involuntary rubbing of the eye is to be provided against also. If possible, the eye should not be uncovered, and exposed to the stimulus of light, for at least three or four days. The symptoms of inflammation must be carefully watched, and treated when they occur; by bleeding, purging, and abstinence—but obviously not by nauseants. Mercury, too, is inexpedient, lest it prevent such exudation as is necessary for the healing of the cornea. The period of inflammatory risk having passed, the eye is gently and gradually accustomed to its wonted stimulus; but exercise of its full function is to be very slowly resumed.

Fig. 55.

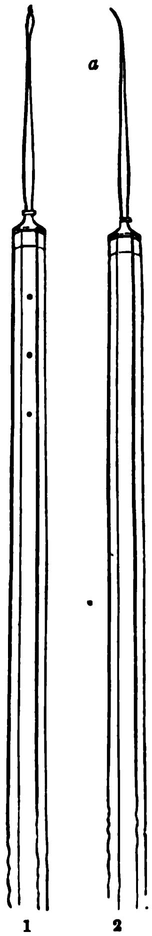


Depression. (From Wharton Jones.)

Depression or *Couching*, implies downward displacement of a solid cataract, which it is not found expedient to extract. The pupil having been dilated by belladonna, the position of the patient is arranged as for extraction. The needle used for this purpose is the one known as Scarpa's, and which is curved at its point. It is pushed through the sclerotic, on the external side of the cornea, in the transverse axis of the eye, at the distance of a line from the corneal margin; this point being selected in order to avoid the two divisions of the long ciliary artery, which vessel usually bifurcates at a distance of two or three lines from the corneal margin; also to avoid wounding the retina and the ciliary body. The needle having entered, is pushed steadily forwards into the anterior chamber, between the iris and the lens. By depressing the hand a very little, its point is brought into contact with the upper part of the lens, the concavity of the instrument being opposed to that body. By now elevating the hand, the lens is depressed towards the bottom of the eye, gently and steadily; and the instrument, having been allowed to rest there for a few moments—detaining the displaced body, till the vitreous humor closes over it—is gently extricated and withdrawn. The eye is now closed, a piece of wetted lint, with a light bandage, is applied, and the ordinary precautions against inflammation are to be adopted as after extraction.

Comparative facility of performance is in favor of depression. But the manifest objections are; danger of chronic inflammatory affection, in consequence of the displaced body pressing upon or irritating the retina and ciliary processes; disorganization of the vitreous humor; and the possibility of future escape of the lens upwards—again to obstruct the transmission of light.

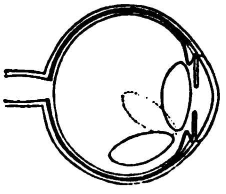
Fig. 56.



Scarpa's needle. 1. Front view. 2. Side view.

Reclination is a modification of depression. The instrument used, and the manner of introducing it, are the same as in the operation for depression; but the lens, instead of being completely dislocated and pushed downwards, is simply made to revolve partially, so as to turn its superior margin backwards into the vitreous humor; while its anterior surface is directed upwards, and remains nearly on a level with the lower edge of the pupil. Less injury is done to the retina than in depression; but re-obstruction of the pupil is at least equally probable.

Fig. 57.



Reclination.—From Wharton Jones.

The operation to promote absorption, or *Dissolution*, is practised when the lens is of fluid or semifluid consistence. The procedure is simple, and easily performed, but requires repetition; and the result is tardy and may be uncertain. The object is, to admit the aqueous humor to a free and general contact with the substance of the lens—a circumstance which experience has shown to be conducive to absorption or solution of the latter. When *breaking up* is intended, the needle is introduced as for depression. Its point having reached the pupil, in front of the lens, is made to divide the capsule by a slight rotating motion, and also to break up the lens into fragments. If the lens be fluid, no division of its substance is necessary; it escapes at once into the aqueous humor, on its capsule being opened. When of soft consistence, a few of the fragments often find their own way into the anterior chamber; if not, they are gently placed there by the needle; for in that locality absorption or solution seems to advance more rapidly than behind the iris. Care must be taken, however, not to dislodge the lens forward in a mass, or in bulky fragments; otherwise untoward inflammation may be induced, in the iris and other parts, by pressure of the lens upon them.

At the first operation, the lens is divided but slightly. Many deem it sufficient to divide the capsule only; and certainly it is well not to attempt any displacement; when the operation, however, requires to be repeated, the lens may be more freely broken up. A few weeks are allowed to intervene between the operations; and after each, ordinary antiphlogistic precautions are to be adopted.

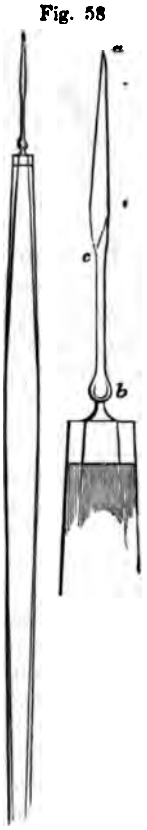
[Division of the lens, for subsequent gradual solution, is the operation which has been generally preferred in Philadelphia, by the surgeons of Wills' Hospital for Diseases of the Eye. It has succeeded fully in that hospital in a very large number of instances of hard, and moderately hard, as well as of soft cataract. Dr. Littell employs a fine straight lance-shaped needle, with a short cutting shoulder and a sharp point; his object being to lacerate the capsule, and divide the lens with as little disturbance as possible of their relations with surrounding parts. (See Littell's Am. Ed. of Hayne's Walton's Operative Ophthalmic Surg.) Dr. Hays prefers a knife-needle, of which the accompanying cuts, Fig. 58, afford an accurate idea. (See Am. Journ. Med. Sci. July, 1855, p. 82.) A somewhat similar instrument, but with a straight edge and more like a miniature bistoury, is recommended also by Dr. Neill (Med. Exam. June, 1855, p. 322). We must refer to the last American edition of Lawrence for the details of Dr. Hays's mode of using his needle in the different cases. (See also Hewson's Am. Ed. of Mackenzie, and the 2d Am. Ed. of T. W. Jones's Ophthalmic Med. and Surg.)]

The operation by *drilling* is performed through the cornea. A straight needle is entered near the corneal margin, and passed through the pupil into the substance of the lens. Having penetrated into this, to the extent of about a sixteenth of an inch, it is rotated freely, and carefully withdrawn. The proceeding is repeated from time to time, as in the breaking up; on each occasion a fresh part of the lens being chosen as the site of puncture. The object is to admit the aqueous humor; and, by its agency on the lens, gradual absorption of that body takes place.

After removal of the lens, in any way, a convex glass requires to be adjusted to the eye; in order fully to restore vision. This is the duty of the optician. Only let it be the surgeon's care not to permit any such adjustment, and resumption of the full exercise of the organ, until at least two months have elapsed after the operation—and more especially if that operation have been by extraction; for not until then will the eye be safe from accession of inflammatory disease.

If after removal of the lens, by operation, the capsule become opaque, and occupying the pupil, obstruct vision, it may be got rid of in one of three ways. It may be extracted, through a minute aperture in the cornea, by a hook, or by small forceps. It may be detached at its ciliary margin, by a needle, and depressed, like a lens. Or it may be crucially divided by the needle; and the flaps shrinking from the centre, may leave the pupil patent and sufficiently free to admit light.

Fig. 58



[Hays's Knife-needle. The first cut represents its natural size; the second is an enlarged diagram of the blade in profile.]

Affections of the Humors of the Eye.

Hydrophthalmia.

Dropsy of the eye may depend on excess of the aqueous humor, of the vitreous humor, or of both. In the first case, there is tension, prominence, change of form, and increasing nebulosity of the cornea; the iris is changed in color, and impaired in mobility; the pupil is dilated; vision is much affected; there is a sense of fulness in the eye; and more or less headache is complained of.

When the vitreous humor is increased in quantity, enlargement and tension of the whole eye occur; the iris is motionless, and arched forwards; the sclerotic is attenuated, and has a bluish or brown appearance; vision is wholly lost; and the pain is deep-seated and severe.

Ultimately the eyeball protrudes between the lids, inflames, and ulcerates; or rupture takes place, with partial evacuation of the humors.

Palliation is in our power, by evacuation of the redundant fluid,—by puncture of the cornea or sclerotic, or by incision of the former texture. Sometimes the progress of the disease may be delayed, if not arrested, by counter-irritation and constutional treatment.

Synchysis Oculi.

The term *Synchysis* denotes a deficiency, and unnatural fluidity of the vitreous humor. The eye is shrunk and flaccid; the iris is tremulous; the pupil is motionless, and vision is either impaired or lost. Not unfrequently the lens becomes opaque. The disease is usually regarded as incurable.

Glaucoma.

By *Glaucoma* is understood an amaurotic state of the eye; with a greenish opacity, behind the pupil, concave, and deeply seated. According to some, this state is mainly attributable to affection of the retina; according to others, the choroid coat is chiefly implicated; while a third class are of opinion that change in the lens and vitreous humor is the principal cause of the disorder. It is probable that all these textures are more or less involved. The prominent and characteristic symptoms are, impairment or loss of sight, permanent dilatation of the pupil, green discoloration of the vitreous humor, and in the advanced stage of the disease opacity of the lens. Diagnosis from cataract is made easy, by observing that the opacity is more deeply seated than the lens; and that it becomes indistinct, or even invisible when viewed laterally. The catoptrical test shows the three images of the candle at first; by and by the middle inverted one is extinguished; but the deep-seated erect image generally remains throughout.

At the commencement of the disease, amendment may sometimes be obtained by local depletion, counter-irritation, alteratives, and a mild mercurial course, or exhibition of the iodide of potassium. If gouty or rheumatic symptoms exist—as is not unfrequently the case—the ordinary appropriate treatment is directed against that particular state of system. The advanced form is incurable. The disease seldom occurs, except in those of mature age.

Ophthalmitis.

This term, in its correct acceptation, denotes involvement of the entire globe of the eye in inflammatory disease—an affection of much danger to structure and function, as can be readily understood; and one which demands the most careful and active treatment. The ordinary results of this inflammatory process are opacity, ulceration, or staphyloma of the cornea; adhesions of the iris, with contraction of the pupil; cataract; and often complete destruction of the organ of vision.

A very severe form of this disease occurs in puerperal women—sometimes in connection with the malignant childbed fever—sometimes independently of this. The symptoms are generally of the highest intensity,

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vision is rapidly impaired, and often there is great chemosis. Cases occasionally occur where the inflammation goes on to suppuration; the eye becoming a phlegmon. In such circumstances, great relief is experienced by opening the abscess.

Wounds of the Eyeball.

These are very common causes of acute ophthalmitis. And, accordingly, their treatment must be carefully conducted in order to avert disastrous results. If foreign matter lodge in the interior of the eye, antiphlogistics will avail but little, so long as the foreign body remains; the globe will suppurate, burst, and collapse. It is an important indication, therefore, to ascertain the presence and site of a foreign body, and to effect its removal. But the same difficulty is encountered as in the case of the brain. It is difficult to ascertain either the site or presence of the foreign matter; and, even when these are plain, it is often very difficult to effect its removal, without most serious injury to the organ. In regard to prognosis, it is important to bear in mind that there may be foreign matter in the interior of the eye, without any apparent solution of continuity in either the cornea or sclerotic. For, the elasticity of texture may at once close the chasm in the tunic, and conceal it from even minute inspection.

Entozoa.

The *Filaria medinensis* has been found beneath the conjunctiva; the *Filaria oculi humani* in the lens. In the latter texture, also, have been found the *Monostoma lentis* and the *Distoma oculi*. The *Cysticercus telæ cellulosæ* has more than once occupied the anterior chamber; it may be removed by section of the cornea.

Tumors.

The eyeball is liable to be the seat of two kinds of tumor; both malignant,—the medullary, and the melanotic. Carcinoma is rare. The medullary tumor is most common at an early age, and seems usually to originate in connection with the retina; growing from the bottom of the eye, occupying the chamber of the vitreous humor and rapidly making its way externally. Loss of vision is early and complete; the tumor in its first stage can be seen dimly, through the pupil; and the pain, cachexy, and other signs of the medullary tumor are present to testify its character (*Principles*, 4th Am. Ed. p. 292). When the coats of the eye have given way, the tumor increases more rapidly than before; a fungus is thrown out; and this may assume the hemorrhagic tendency. The end is death. Cure can be attempted in but one way,—by extirpation of the eyeball; and that only at an early period, when the disease is confined to the interior of the globe; and even after removal of the globe, the disease frequently returns again in the optic nerve; eventually destroying life. In the advanced stage, all operative interference is contra-indicated; reproduction is certain; and the progress of the disease, instead of being arrested or retarded, is likely to become accelerated. Indeed, the cases are very few in which the operation has proved thoroughly successful. Once I had occasion, on account of false aneurism at the bend of the arm, to tie the humeral artery of a gentleman aged thirty-three, who, at the age of nine, had undergone extirpation of the eyeball on account of medullary tumor;[1] and in him there has never been the slightest symptom of return.

The melanotic tumor generally occurs after the middle period of life; it slowly fills up the interior of the eye; is seen dim, black, and bulging, through the pupil; ultimately thinning the coats, and forming dark colored external projections of the sclerotic; attended with pain, tension, and early loss of vision. In some cases, care is required not to mistake the disease for simple staphyloma of the sclerotic. The only cure is extirpation of the eyeball, and this should be done at as early a period as possible.

Extirpation of the Eyeball.

This operation may be required on account of tumor of the eyeball; tumor of the orbit, involving the globe secondarily; cancerous ulceration of the eyelids, involving the globe, or destroying the whole of the eyelids—as formerly explained. The commissure of the eyelids having been divided, at the outer angle, so as to afford space, the globe is laid hold of by a volsella; and by this instrument is steadied and directed, throughout the remainder of the procedure. A straight bistoury is entered at the margin of the orbit, and made to move round, so as to detach the muscles and other parts from the bone; the point, however, being used very carefully at the bottom of the orbit lest perforation of the thin orbital plate should occur. The optic nerve is then cut across, and the tumor withdrawn. If there be reason to suspect unusual attenuation of the bone—perhaps partial deficiency—it were no unwise precaution to effect the deeper dissection by the handle of the scalpel. If the lachrymal gland have escaped the general removal, it may be seized by a hook, and dissected away; but this is not absolutely necessary. Having become satisfied of the entire removal of the diseased structure, the cavity is sponged clear of blood; dossils of dry lint or charpie are placed so as to fill the orbit and project somewhat beyond the margin, and a retaining bandage is passed around, with sufficient firmness to arrest bleeding from the ophthalmic vessels. After a few days, the dressing is gradually undone and removed; suppuration is established; granulation succeeds; and the granulating wound is to be treated in the ordinary way. After cicatrization, an artificial eye may be adapted to the socket.

Congenital Deficiency of the Eyeball.

An interesting example of this occurred to me some years ago. A girl, strumous, and of strumous parentage, labored under conjunctivitis, which proved very obstinate, and had already produced considerable opacity of both corneæ. The mother, naturally of an anxious temperament, had her every thought engrossed by the state of this child—then an only one. She again became pregnant; and still persevered in her watchful nursing unweariedly, and, if possible, with an increased solicitude. The second child was born at the full time. It proved a male, well-formed, and seemingly perfect in every way. But, on opening the eyelids, not a vestige of either eyeball could be found. The lids were perfectly normal in both form and size, but gave no sign of globular projection beneath; and on opening them, red, fleshy, mucous-looking membrane, flat and loose, was found to be the apparently sole occupant of the orbits. As the child grew, the congenital deficiency remained unaltered.

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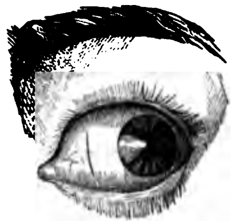
[1] Edinburgh Medical and Surgical Journal, vol. xix, p. 51.

Strabismus.

Squinting may affect one eye, or both. Very frequently both are implicated; but one only in a minor degree. The immediate cause obviously depends on inharmonious action of the recti muscles. One may act excessively, while its antagonist retains quite its normal character; and displacement is effected by the former. Or—as there is good reason to believe frequently happens—one retains its normal condition, while the other is enfeebled, or altogether paralyzed; and displacement is caused by the former. The ordinary varieties of squinting are the *Convergent*, looking inwards; the *Divergent*, looking outwards. The former is by much the more frequent.

A great advance has been made in the treatment of this deformity, by having recourse to division of the muscle on the side towards which there is displacement—an operation suggested by Stromeyer, and first performed by the late Dr. Dieffenbach, of Berlin. The patient is placed as for other ophthalmic operations. The eye which is not the subject of treatment is closed; and the patient is made to turn the affected organ in the direction opposite to that of the squint. A fold of conjunctiva, between the cornea and the angle of the eye, but nearer to the latter than to the former, is then seized and elevated, by means of common dissecting forceps; and is divided by a stroke of the scissors. By one or two touches of the scissors, aided by the forceps, the subconjunctival areolar tissue is cut, and the muscle exposed—at that point where it ceases to be fleshy and begins to be tendinous. It may either be gathered up by the forceps, or elevated on a blunt hook passed beneath. It is then divided completely. And it is well to make at the same time, a clean dissection of the sclerotic, for some little distance on either aspect of the muscle; so as to divide any bands of fibrous or areolar tissue, which might otherwise act retentively on the malposition of the eye. If the organ prove unsteady during the operation, it may be expedient to control its motions by means of a sharp, short, double hook, inserted into the sclerotic conjunctiva at a safe distance from the corneal margin. The operation over, and all instruments withdrawn, the patient is directed to look as he formerly squinted. If he find a difficulty in re-effecting the displacement, the

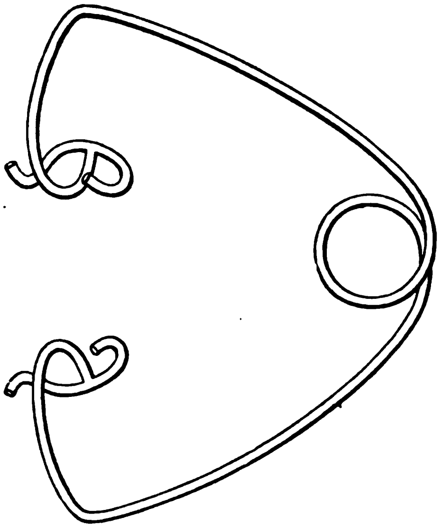
Fig. 59.



Plan of the eye, showing the line of incision in the conjunctiva.

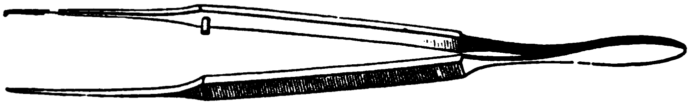
immediate result of the operation may be considered as fully attained. But, otherwise, it is necessary to make a more free division of the textures implicated; in all cases, however, taking care not to occasion an unseemly exophthalmos, by carrying such division to an undue extent. [The engravings on this page and the next, represent the instruments recommended for this operation, by Dr. Hays, in his edition of Lawrence (p. 888, et seq.), already cited; they will be found to answer very well.] The eye is covered up for a day or two; and moderate antiphlogistics are used. Untoward inflammatory results seldom occur. The wound may unite by adhesion. More frequently, it heals by the second intention. Sometimes a fungous granulation forms; this is removed by the scissors, and is subsequently kept down by gentle escharotics. After a few days, the functions of the eye are to be resumed, and they should be so arranged as to give the organ an habitual movement in the direction opposite to that whereto it was formerly directed. Indeed, this exercise or training of the eye, subsequently to the operation, is a very essential part of the treatment; and should be begun at an early period after the operation—almost immediately; otherwise an improper reunion of the divided muscle may take place, and mal-adjustment of the eyeball be restored.

Fig. 60.



[An elastic steel-wire Speculum for separating the Eyelids.]

Fig. 61.



[A pair of small Toothed-Forceps, for pinching up a fold of the Conjunctiva.]

Occasionally the cure is more than complete; squinting in the opposite direction being threatened. And were the other rectus muscle now to be divided, unseemly projection of the eyeball could not fail to be produced. Fortunately, it is often sufficient to excise merely a portion of the conjunctiva near the cicatrix of the wound; the contraction of this new sore, in healing, tending to restore the normal position.

Sometimes it is sufficient to operate on one eye only. At other times we are compelled to operate on both. For, when both eyes are implicated in squinting—though in very unequal degrees—it will be found quite impossible to restore parallelism in position and motion, if the myotomy be limited to that organ which is most prominently affected—let the division be as extensive as it may.

Fig. 62.

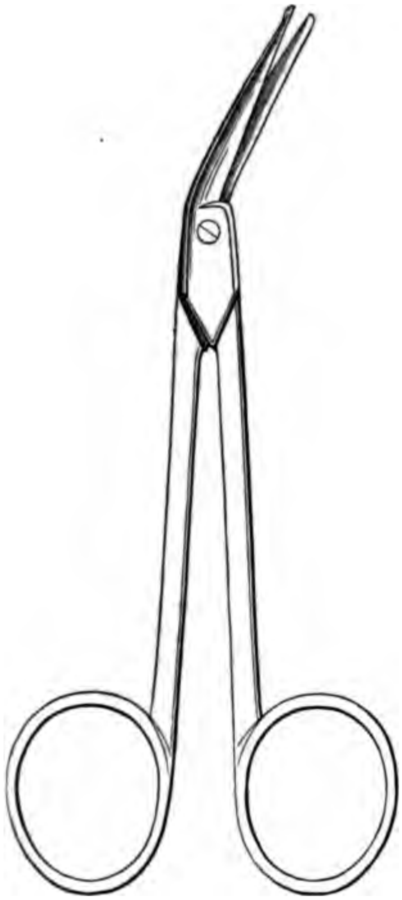


Fig. 63.

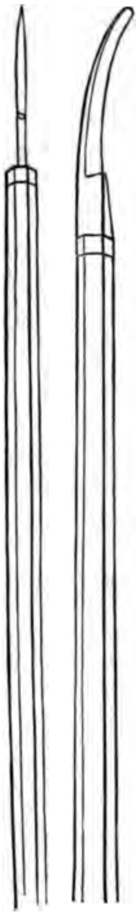
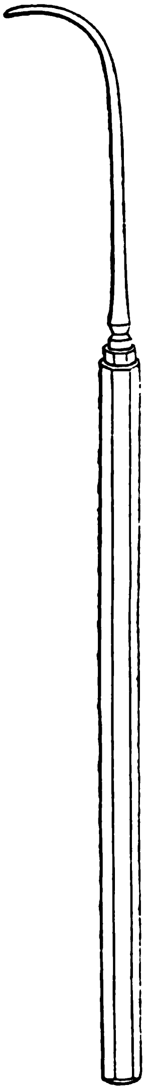


Fig. 64.



[Fig. 62. A pair of small Scissors, one blade probe-pointed, for dividing the Conjunctiva and rectus muscle.

Fig. 63. A small Iris-Knife, which may be used instead of the Scissors, if preferred; also a knife for dissecting conjunctiva from sclerotica.

Fig. 64. A blunt silver Hook to be passed under the muscle previous to dividing it.]

When operation proves in all respects successful, not only is deformity removed; the function of sight is also materially benefited. But all squints do not require myotomy. According to the cause and circumstance, the treatment varies.

Strabismus may be congenital. During early adolescence, attempts are to be made to remedy the evil by due exercise or training of the organ; when one only is affected. The sound eye is to be covered up, for some hours in the day; and the other, employed exclusively, may in time be compelled, as it were, to look straight upon the objects of sight. But care must at the same time be taken, that the sound eye do not suffer from undue confinement and disuse. Or a pair of spectacles, or goggles, may be worn occasionally, through which the patient cannot see with both eyes, unless they are directed in a parallel manner. When such means fail, myotomy may be had recourse to.

Squinting not unfrequently is the result of imitation. This must be corrected by breaking off the habit, and removing the patient from circumstances likely to induce its repetition; also by the remedial exercise of the organ just noticed. The like treatment is available, when squinting has been induced by the presence of marks on the nose or cheek, to which the eyes are from time to time directed; when it has followed on a long confinement of the patient to one posture, perhaps constrained; when it is the result of using one eye habitually and painfully directed on small objects, as in certain mechanical professions.

In children, squinting is not unfrequently connected with gastric and intestinal irritation; and is remediable by purgatives, alteratives, or anthelmintics. In such cases the strabismus is almost invariably convergent; as can be readily understood, when it is remembered how closely the sixth pair of nerves is connected with the sympathetic. Sometimes squinting is but a sign of general disorder in the system; and disappears, along with the other symptoms, under appropriate constitutional treatment. At any age, it may be the concomitant of important cerebral disorder.

Not unfrequently, squinting occurs as a sequela of some infantile disease. In such cases, the affection is of an atonic character; and may be mitigated—perhaps removed—by a general tonic system of treatment, by the application of strychnia to the temple and forehead, or by the passing of electro-magnetism through the part.

As a general rule, the operation should not be performed, until other means likely to prove remedial have been found insufficient. And in the case of the female near the age of puberty, the operation should always be withheld, until the catamenia have appeared; inasmuch as, on this occurrence, rapid amendment and removal of the deformity is by no means unlikely to occur.

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CHAPTER VI.

AFFECTIONS OF THE NOSE.

Fracture of the Nasal Bones.

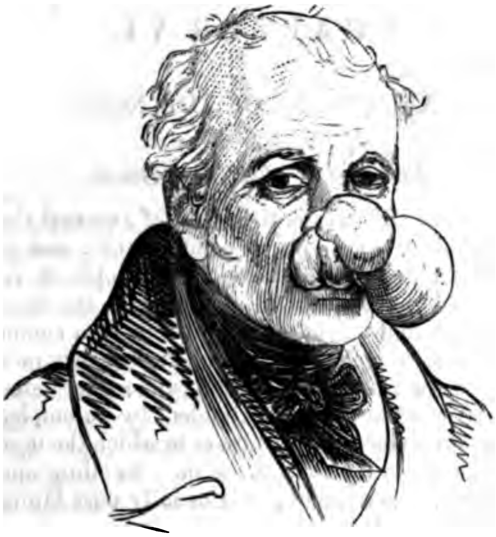
FRACTURE of the nasal bones is the result of external violence, directly applied. It may be either simple or comminuted; and the latter form is of frequent occurrence. It may be either simple or compound; and the latter form may be constituted by wound of the integument, or by laceration of the internal mucous membrane, or by a combination of both circumstances. Deformity, by displacement, is a very prominent feature of the injury; the slightest manipulation suffices to detect crepitation; and this sensation is often greatly extended, by an emphysematous condition of the areolar tissue, in those cases in which the mucous membrane has sustained greater injury than the skin. Swelling and discoloration occur, to a greater or less extent; and usually pass laterally and downwards, to the eyelids and cheek.

Replacement is easily effected, by passing a pair of small dressing forceps, or the ordinary polypus-forceps, shut—or a goose-quill, blowpipe, director, or female catheter—into the upper part of the nostril; pressing outwards with the instrument, so as to restore the normal position of the fragments; and at the same time modelling them into their proper place by the fingers of the other hand applied externally. Sometimes, indeed, it may be in our power to improve on the original elevation and to impart to the organ a more pleasing contour than it originally possessed. If any small fragments be completely detached and exposed, they should be at once removed. No retentive apparatus is necessary; for redisplacement is not likely to occur, unless under reapplication of external violence. But if bleeding prove troublesome from the membrane, it may be necessary to plug the nares gently with lint. If there be wound of the soft parts, it is treated according to ordinary principles. And, in all cases, the requisite precautions are put in force against the accession of inflammation, and the risk of erysipelas.

Lipoma of the Nose.

By this term is understood a hypertrophied condition of the integument and subcutaneous adipose tissue of the apex and alæ; seldom occurring but in the male, of advanced years, who has lived freely. When the enlargement is partial and of no great bulk, no operative interference is required. It is sufficient to attend to regimen, and to the state of the general system, so as to prevent, if possible, further growth; and direct medical treatment may be applied to the organ itself, with a view towards restoring it to a normal state. But when the growth is large, it proves a serious inconvenience; interrupting vision, and interfering unpleasantly with the spoon and the wine-glass; and in consequence, surgical aid may be asked, and granted. The redundant growth is to be carefully pared away. A finger having been placed in the nostril, so as to distend the part, and facilitate dissection—while, at the same time, division of the cartilage is provided against—the scalpel and forceps are carefully used, so as to remove the whole of the changed integuments. The bleeding is considerable; but is quite amenable to arrest by cold, pressure, and ligature. Sometimes the parts are so dense as to preclude ordinary use of the ligature; in which case, if pressure fail, the curved needle is to be employed (*Principles*, 4th Am. Ed. p. 819). Cicatrization is tardy; but, when obtained, is satisfactory. Apparent reproduction may take place, by growth from the surrounding integument, formerly unaffected; but the cicatrix itself usually remains firm and depressed.

Fig. 65.

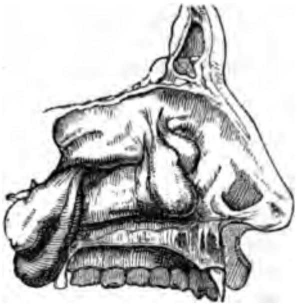


Lipoma of the nose.

Polypus of the Nose.

Nasal polypi are of various kinds; simple-mucous, and cysto-mucous; fibrous; and medullary (*Principles*, 4th Am. Ed. p. 361). The first are, fortunately, of most frequent occurrence; and usually are found adherent to the investing membrane of the superior turbinated bones.

Fig. 66.



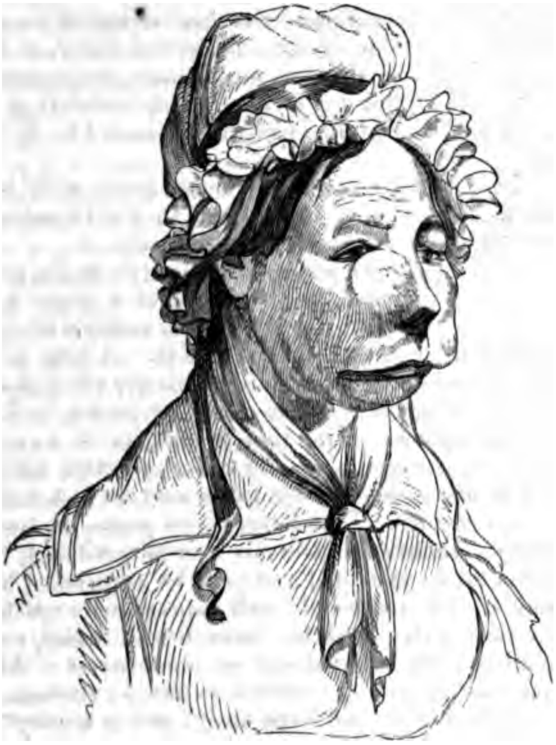
Simple mucous polypi, seen growing in the nasal passages.

The symptoms of the common mucous polypus are sufficiently characteristic. The patient feels that something unusual, and apparently fleshy, is occupying the nostril; calls to blow the nose are unusually frequent, and can be but imperfectly obeyed—passage of air through that nostril being found to be much obstructed; there is a preternatural amount of mucous discharge from the part; on attempting to blow the nose, a great portion of the mucous secretion is thrown into the pharynx; there is a constant feeling as if there existed "a cold in the head;" very frequently, there is lachrymation, the extremity of the nasal duct being compressed by the growth, or the lining membrane of the duct being sympathizingly involved in congestion; and these uncomfortable circumstances are all aggravated in damp and variable weather. On looking into the nostril, the tumor is seen; and, when the speculum is used, a very distinct exploration of its bulk and form may in most instances be effected. When the mass has attained to some considerable size, it renders itself apparent, by projecting on the upper lip. As it enlarges backwards, deafness may be produced, by pressure on the Eustachian tube, and giddiness may be occasioned by compression of the jugular. The sense of smell is necessarily much impaired; and so in many cases is that of taste. Speech is indistinct, and snuffling. In sleep, the patient is an habitual and sonorous snorer. After a time, the countenance may undergo a formidable change; the nasal bones becoming gradually disjoined and expanded; giving a very unpleasant breadth to this part, and establishing the condition which is ordinarily termed "Frog's Face." Then—and often, also, at an early period of the case—pain is complained of in the head, especially in the forehead.

In the minor cases, it is essential that diagnosis be accurate. Symptoms are not trusted to alone. The speculum must be employed, so as to expose the nasal cavity; enabling us to ascertain whether the obstruction depends on nascent polypus or not. For the disease is apt to be simulated. There may be merely a general congestion of the lining membrane. Or there may be a bulging of the septum to one side, with or without congestion of the membrane on the convexity of the bulge. There may be abscess forming between the septum and its investing membrane. Or there may be an hypertrophied condition of the spongy bone. Any of these circumstances may produce more or less occlusion of the nostril, increase of discharge, snuffling of speech, and most of the ordinary symptoms of polypus. By use of the speculum only can the true condition of parts be determined.

If there be no polypus, no forceps are required. For congestion, abstraction of blood and astringent lotions are sufficient, with roborant treatment constitutionally. Abscess of the septum may be prevented by leeching; when formed it requires evacuation. Displacement of the septum, and enlargement of the bone, call for no interference.

Fig. 67.



Frog face: the polypi causing much deformity by expansion of the bones, and change of relative position in the soft parts.

Removal of the common polypus is effected by twisting and evulsion (*Principles*, 4th Am. Ed. p. 361). Care is taken to apply the forceps accurately to the neck of the tumor, so as to insure removal of the entire mass; and gentleness is used, so as not to endanger avulsion of bone. The forceps are well toothed, firmly jointed—and may be further secured by a pin between the blades, so as to prevent them passing each other during the twisting movement; strong, yet not so bulky as those commonly in use—less than the "dressing forceps" of the ordinary pocket-case. Sometimes forceps considerably curved are useful in reaching small soft polypi which not unfrequently grow from the upper and front part of the nares, and which the ordinary instrument passes by. The tumors being generally numerous, more than one operation is usually required, to effect eradication of the whole; and of this the patient should be warned in the first instance, to prevent disappointment. After temporary clearance of the nostril has been effected, the cavity is plugged with lint; to arrest bleeding, and prevent the access of cold air to the raw surface.

A second operation is not attempted, until the inflammatory results of the former have completely subsided; nor until examination by the speculum has revealed the fresh crop of tumors, somewhat advanced to mature development. This may be after weeks or months.

After the nostril has been finally cleared, the use of an astringent is advisable—such as a solution of zinc, nitrate of silver, alum, matico—with a view to prevent reproduction, and restore the mucous membrane to a sound state. The following form is often found very suitable:—Sulphate of Zinc half a drachm, Tincture of Galls one drachm, Water eight ounces.

If evulsion be found to cause inordinate pain, with inflammatory symptoms, the attachments of the polypi, in the repeated operation, may be severed by probe-pointed scissors or knife.

The dense fibrous polypus, when originating from the posterior part of the nasal cavity, projects backwards, is of a somewhat pyriform shape, and hangs pendulous in the fauces. For removal of such a tumor, the use of ligature is by some thought suitable. A long double loop of wire, catgut, or strong cord, is passed through the affected nostril. The noose is caught, as it appears in the posterior fauces, by forceps introduced through the mouth. And then, by fingers or forceps, the loop may be carried over the fundus of the tumor; so that on drawing the ends hanging out of the nostril, the noose may be run tight upon the upper part of the growth. This having been done, the nasal ends are passed separately, through a double silver canula, which is then pushed into the nostril until its extremity rests on the polypus. By pulling the ends, the noose is now completely tightened, so as to strangulate the mass at its attachment. And the ends drawn tightly, are secured through rings placed for this purpose at the anterior extremity of the canula. From time to time, a renewal of the tightening may be had recourse to. The tumor at last drops away; and is either swallowed, or coughed up and discharged by the mouth.

Sometimes, however, the noosing of the mass cannot be so easily accomplished. The double ligature having been passed as before, the loop hanging out of the mouth is divided, so as to constitute two single ligatures. The oral end of one is passed through a long single canula, and is carried carefully under the base of the tumor on one side. In the same way, the corresponding end of the other ligature is managed; so that this ligature passes round the tumor on the opposite side. The directing canula having been then withdrawn, the double form of ligature is restored, by uniting the oral ends in a firm knot. The nasal ends are now drawn; and the noose is run tight on the tumor, at its upper part, as before; tightening of the noose being effected by means of the double canula passed through the noose.[1]

But a dense and firm polypus may occupy the anterior part of the nares; broad in its attachment, and firmly united with both periosteum and bone. Such tumors experience has declared to be prone to degeneration; early becoming vascular, softening, and ultimately assuming the medullary character. Removal therefore is highly expedient; and, to be effectual, it must be both early and complete. Ligature will not suffice. The morbid structure must be cut out, along with the parts from which it springs, and with which it is intimately incorporated. The operatoin is formidable and severe—but not the less expedient. No fixed rules can be given to guide the operative procedure. It may be possible to disclose the tumor and its site sufficiently by simple incision of the nostril. Or it may be necessary to remove a portion of the superior maxilla.[1]

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[1] Brodie, Lancet, No. 1058, p. 316.

The *medullary* and malignant nasal polypi may be regarded as incurable. By the time the case has been submitted to the surgeon, the morbid structure has so extended as to render its entire removal, by any feasible operation, impracticable; and we content ourselves with palliation. If much distress be occasioned by occlusion of the nostril, the soft obstructing mass may from time to time be pushed away by the finger or probe; but even this interference must be very carefully practised, lest troublesome hemorrhage ensue. Also, let us beware of mistaking protrusion and pointing of the tumor, at the internal canthus, for fistula lachrymalis about to form.

The erectile tumor has been found growing from the anterior nares; not merely an inconvenience, but dangerous by tendency to hemorrhage. Cure has been obtained by destructive application of the actual cautery to the diseased tissue.[2]

Rhinolithes.

Rhinolithes, or calculi of the nasal fossæ, are composed of mucus, phosphate of lime, and the carbonates of lime and magnesia; and are most frequently found in the inferior meatus. In volume they vary from a pea to a pigeon's egg; in color black, gray, or white; of rough surface; and often containing a foreign body, or the root of an incisor tooth, as a nucleus. Sometimes they create but little disturbance; in other cases chronic inflammatory disease is lit up; in some suppuration occurs, with profuse fœtid discharge; and the septum may ultimately give way by ulceration, the whole organ becoming seriously deformed. The eye too may sympathize; and that seriously. Treatment is by extraction of the offending substance; and this is to be effected either by forceps or by scoop, as may seem most convenient; antiphlogistics being afterwards employed to subdue excitement.[3]

Epistaxis.

By this term is understood, an inordinate hemorrhage from one or both nostrils. It may be the immediate result of an operation for polypus; it may follow external injury, with or without fracture of the nasal bones; it may be one of the untoward results of medullary formation, within the nasal cavity, or connected with it; it may be a critical depletion, of natural occurrence, tending towards resolution of an inflammatory process; or it may be the consequence of a passively congested and hemorrhagic state of the schneiderian membrane. The common bleedings of the nose, in adolescents, caused by plethora, and tending to relieve the system from that unsafe condition, scarcely come under the designation of epistaxis; usually the bleeding is not inordinate, is in all respects safe and beneficial, and certainly requires the adoption of no means for its arrest.

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[1] Syme, London and Edinburgh Monthly Journal, 1842, p. 791.

[2] Dublin Quarterly Journal, Feb. 1847, p. 31.

[3] Demarquay, Annales de la Chirurgie, July, 1845; and Ranking's Retrospect, vol. ii, p. 106.

Our first duty when called to a case of alarming hemorrhage from the nose, is not at once to attempt to check it; but to determine whether such an attempt be advisable or not. If the bleeding be habitual, in a robust and plethoric patient, not very far advanced in years—if it be at all critical in its history, as connected with inflammatory attack advancing in some adjacent part—if we are told that the patient has been subject to giddiness, or other affections of the head—we are not to interfere, unless evident signs exist that a greater amount of blood has already flowed than the system can well bear, and that further loss would probably be attended with hazardous consequences. Then—but not till then—we endeavor to prevent continuance. The patient's head is elevated; and cold is applied to the nose, forehead, and back of the neck. All stimuli are forbidden, and absolute rest and quietude enjoined. This treatment failing, astringents may be taken into the nostril, and applied to the bleeding surface, by injection or by insufflation—Ruspini's styptic, a solution of zinc or alum, turpentine dilute, powdered gall-nuts, matico, &c. And this method of arrest may be assisted by obstruction of the anterior nares; either by compression, or by stuffing the cavity firmly with lint, after the styptic has been sufficiently applied. Lately, it has been proposed to elevate the arm, or arms, and to retain them raised above the head; and certainly this proceeding would seem occasionally to contribute, at least towards the successful result; perhaps in consequence of greater power being required to propel the arterial blood upwards in the arm, and less consequently being expended on the carotid circulation—as the originator,[1] Dr. Négrier, imagines; or perhaps in consequence of the increased facility of venous return in the subclavian vein "hurrying the return-blood in the jugulars, and thus deriving from the bleeding vessels of the nose."

When such minor means fail, it is necessary to plug the nares, both anteriorly and posteriorly. A long stout ligature is passed through the nostril into the mouth; by means of a flexible bougie, a loop of wire or catgut, or a springed instrument made for the express purpose. To the upper part of the oral extremity of this ligature, a portion of sponge or a dossil of lint is attached, of sufficient size to occlude the posterior opening of the nostril; and by pulling the nasal extremity of the ligature, this obstructing substance is firmly impacted; the extremity of the oral portion of the ligature remaining still pendent from the mouth. The anterior nostril is then filled with lint, pushed firmly from the front. After three or four days have elapsed, the apparatus is removed, gently. The anterior plug is withdrawn by means of forceps; the posterior is extracted by pulling the oral extremity of the ligature, previous dislodgment, if need be, being effected by the cautious pushing of a probe passed through the nostril. Sometimes it is necessary to plug both nostrils; but, generally, the hemorrhage proceeds from one only. Constitutional treatment is not forgotten; more especially if there be reason to suppose that a hemorrhagic tendency exists in the system (*Principles*, 4th Am. Ed. p. 328).

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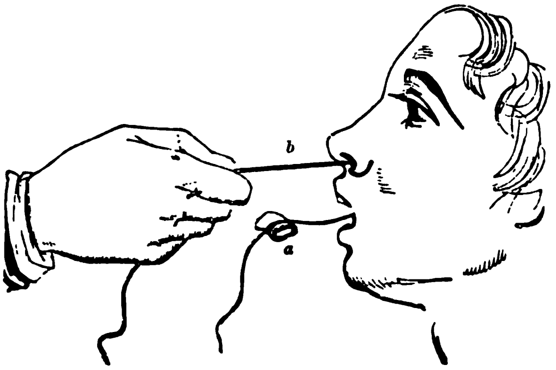
[1] Archives Générales de Médecine, Juin, 1842.

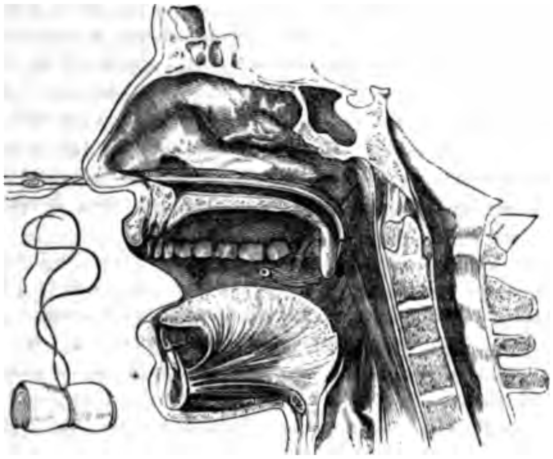
Fig. 68.



The arresting of hemorrhage by plugging. A plug, *a*, about to be lodged firmly in the posterior nares, by means of the ligature, *b*. This having been done, and a plug afterwards placed in the front nares, the bleeding from *that* nostril is fairly commanded.

Another method of plugging the nares has been lately proposed; by inserting a tube of vulcanized caoutchouc, and distending this either by air or water.[1]

Fig. 69.



[Belloc's Instrument for plugging the nostrils. (From Fergusson.)]

After plugging in any way, great care should be taken that all has been thoroughly removed. Serious consequences, both local and constitutional, have resulted from foreign matter—such as a dossil of lint, or portion of sponge—having been left impacted.

When syncope has occurred from epistaxis, in an elderly patient predisposed to head affection, we should be very careful not to excite premature and excessive reaction, otherwise extravasation within the cranium is not unlikely to follow. The head is not to be placed low, as in restoration from ordinary syncope, but should be kept elevated; and stimuli should, if possible, be avoided.

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[1] Lancet, No. 1370, p. 579; also Cyclop. of Pract. Surgery, p. 142.

The Passing of Nasal Tubes.

Flexible tubes may be readily enough passed along the floor of the nostrils into the posterior fauces; and thence they may be directed into either the larynx or œsophagus, as circumstances may require. The former destination is necessary in attempts to restore breathing, in cases of suspended animation; the latter, in order to introduce nutritive ingesta into the stomach—as in cut throat. If, in the latter case, the tube is to be left permanently inserted, the passage by the nose is plainly preferable to that by the mouth; avoiding profuse salivation, and much discomfort.

Foreign Bodies in the Nostrils.

Foreign bodies may lodge accidentally in the nasal cavities; more frequently they are introduced wilfully, by the young and inconsiderate; peas, beads, portions of pencil, and such like substances are very commonly inserted by the thoughtless child. On the foreign body decidedly disappearing inwards, the patient is alarmed; and probably makes desperate efforts to extrude it by the fingers, but with the effect only of pushing it further into the nostril. The parent or nurse is now made aware of the circumstance, and by them similar efforts at dislodgment are made, again with the effect of causing a deeper lodgment. By this time the foreign substance is beyond the reach of the eye; and its site is further obscured by the slight bleeding which has probably taken place during the abortive efforts at extrusion. And in this condition the surgeon finds the case. It is well, in the first instance, to inject a stream of warm water into the nostril; it clears away coagula, loosens the foreign body, and may effect its expulsion. If not, the probe is to be used, the patient's head having been firmly secured; and the best way of accomplishing this, in the child, is to place the head firmly between the knees of the operator—unless indeed anæthesia be employed, as in most cases it should be. By the probe, used gently, we first ascertain the presence and site of the foreign substance—for it may have passed outwards, by the mouth, or downwards by the pharynx. Having discovered the foreign body, the flat end of the probe, slightly bent, or the scooped end of a director, or a curette made for the purpose, is passed down upon it, and insinuated past it; then, by raising the handle of the instrument, and bringing the point to bear upon the posterior aspect of the foreign substance, the latter is dislodged forwards, and may be readily removed. Forceps, however slim, are very likely to fail. They seize the anterior part of the body only; and, slipping, have the effect of causing a firmer and deeper impaction.

Congestion of the Schneiderian Membrane.

The lining membrane of the nostrils is liable to become the seat of a minor inflammatory process; chronic, and unimportant as regards structural change; but troublesome and inconvenient by its continuance. There are redundancy of secretion (often fœtid), uneasy sensation, and a feeling of stuffing in the part; not unfrequently the tone of voice is considerably impaired, and the sense of smell may also be rendered imperfect. Many of the symptoms of mucous polypus are present; and careful exploration by the nasal speculum is necessary, to insure accuracy of diagnosis. If the affection be at all of an acute nature, a few leeches may be required more than once—applied directly to the membrane by means of a suitable glass tube; and in the passive form of congestion, leeching may also be expedient, once, to unload the vessels of the part. Then astringents are employed; solutions of nitrate of silver, sulphate of zinc, chloride of soda, alum, matico, &c., and these are patiently persevered with, either singly or combined. But in all cases an especial regard must be had to the state of the general system. Usually an atonic condition is found; and the greatest benefit is derived from sustained exhibition of the chalybeates. In very many cases, indeed, without this tonic general treatment, all local care would prove of but little avail.

Abscess of the Septum Narium.

Abscess may form beneath the mucous covering of the septum; and, when acute, the inflammatory process which causes it is usually the result of external violence. The chronic form may be independent of all apparent exciting cause, occurring in a patient of broken-down system —probably a victim of the mercurio-syphilitic taint. The bulging swelling is apt to simulate the growth of polypus. During the nascent stage, leeches are to be applied to the part, and other suitable antiphlogistics employed, to prevent suppuration if possible. When matter has formed, an evacuating incision cannot be made too soon, in order to save the cartilage; otherwise great deformity may ensue, by a falling in and shrinking of the most prominent part of this important feature.

Ulcers of the Nostrils.

1. *Simple ulceration* of the Schneiderian membrane is liable to occur from the ordinary exciting causes of ulceration of mucous tissue (*Principles*, 4th Am. Ed. p. 359); exposure to cold, contact of acrid matter, irritation communicated from diseased teeth, &c. The treatment accordingly consists, first, in taking away the exciting cause; seclusion from atmospheric exposure, discontinuance of snuff-taking, removal of diseased teeth or stumps in the upper jaw. And then, according as the ulcer manifests the inflamed, irritable, or weak characters, the applications are bland and soothing, or nitrate of silver in substance or solution, or various gently-stimulant lotions (*Principles*, 4th Am. Ed. p. 208).

2. *Mercurio-Syphilitic ulcers* not unfrequently form in this situation; of a secondary, or, more commonly, of a tertiary character (*Principles*, 4th Am. Ed. p. 60). They are obstinate, and likely to resist all mere local treatment. The more important remedial agents are those which affect the system; especially the iodide of potassium and sarsaparilla.

3. *Ozæna.*—By this term is understood an unhealthy ulceration of the lining membrane of the nose, with affection of the subjacent bone—caries, necrosis, or both combined. Discharge is profuse, and offensive; the ulceration tends rather to spread than to heal; portions of bone from time to time come away; the nose sinks inwards, and is more or less deformed; both articulation and respiration are interfered with; and, ultimately the general health may seriously give way. The nasal bones themselves may perish and exfoliate; and then the deformity is not only great but almost irremediable. The peculiarity of this ulcer is, that the ulceration is of a spreading character—simply acute, or slowly phagedænic; and that the bones are more or less extensively involved. In the adult, few examples will be found in which the abuse of mercury, for syphilitic or other ailments, cannot be traced out as the paramount cause. In children, the affection would seem to be connected with the strumous cachexy.

Treatment is mainly constitutional; as in the simple mercurio-syphilitic sores, without affection of bone. Besides the iodide of potassium and sarsaparilla, arsenic is found a very useful internal remedy—steadily persevered with in small doses. In obstinate cases, benefit has often resulted from exhibition of the liquor hydriodatis arsenici et hydrargyri—a powerful alterative.[1] The local applications are necessarily varied. At first, bland and tepid injections are advisable; afterwards those which are stimulant and alterative. A weak solution of arsenic, solutions of the nitrate of silver, sulphate of zinc, &c., may be employed, as circumstances seem to indicate. Throughout the cure, the chlorides should be used, at least occasionally, as correctives of fœtor. By some, the following combination is held in high repute: an injection composed of from one to two drachms of chloride of lime, rubbed up with thirteen ounces of decoction of rhatany root—strained after standing half an hour. In scrofulous cases, ordinary antistrumous constitutional treatment will, of course, not be neglected.

4. *Lupus*, or *Noli me tangere*, is a confirmed phagedænic ulcer; commencing usually in the upper lip, or at the exterior of the nasal civity; spreading upwards, inwards, and around, but more in breadth than in depth; often healing at one part, while it extends at another; ultimately involving the bones, denuding them, and inducing, by caries or necrosis, such deforming results as at an earlier period follow on ozæna. In advanced cases, the soft parts of the nose, and not a little of the hard, may be wholly destroyed; while an unseemly chasm has also been made in one or both cheeks. The destructive process may advance still more extensively, producing deformities more and more hideous, and ultimately proving fatal by hectic exhaustion. The disease is most common in adults—of the poorer sort, ill-fed, ill-clothed, scrofulous, or tainted in system by mercury, and too probably also given to habits of intemperance. Sometimes, however, it attacks the most careful and correct. As in other phagedænic ulcers, the affection may be either chronic or acute (*Principles*, 4th Am. Ed. p. 227).

Treatment is partly constitutional—such as recommended in ozæna; partly local, consisting of such applications as are found most suitable for arrest of phagedæna (*Principles*, 4th Am. Ed. p. 228). An escharotic, such as chloride of zinc, nitric acid, or nitrate of mercury, is first employed; and then the sore is subsequently treated according to the characters which it presents. When it threatens to become irritable, and verges again towards phagedæna, a weak solution of arsenic is found of much service. Of escharotics, the chloride of zinc is perhaps most employed, in the form of paste; and is especially useful when bone has become affected; for it seems to hasten exfoliation. Occasional use of the simpler chlorides is as essential as in ozæna. Sometimes repeated leeching is useful. After arrest and cicatrization, the greatest constitutional care is still required; otherwise reaccession of the disease is extremely probable.

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[1] Dublin Journal of Medical Science, September, 1840, p. 96.

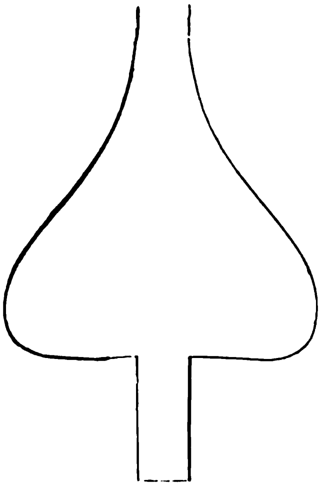
5. *Cancerous ulcer* may implicate the nose, by extension from the face; or may originate in the former site. It is amenable to but one treatment—early removal by knife or escharotic, or by both.

Rhinoplastics.

When the soft parts of the nose have been destroyed, partially or wholly, by wound, ulceration, or sloughing, they may be restored in some measure, by transplanting a compensating amount of cutaneous and subcutaneous tissue, borrowed from an adjoining part. When ulceration has been the destroying agent, no restorative operation is ever to be attempted, until satisfactory evidence have been afforded that all ulceration has ceased, and is not very likely to return on the application of a common exciting cause of inflammation. Under any circumstances, it is plain that the sequela of lupus presents a much less favorable prognosis, than when the cicatrix is the result of wound, or any other simple casualty.

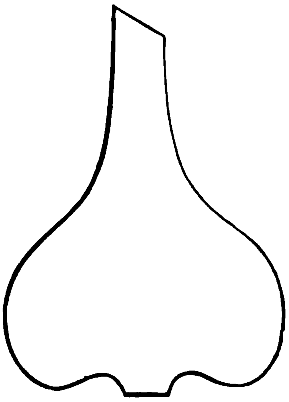
When almost the entire organ has been removed, its restoration is attempted as follows:—A piece of card or leather is shaped of the required dimensions, to constitute new alæ and apex; the columna being left for an after proceeding. And this outline of the new structure should always be rather too large than otherwise, there being great tendency to shrivel by absorption, after the flap has become fixed in its new locality. The edges of the cicatrized sore, on which the borrowed flap is to be adjusted, are made raw by the knife. The outline of the flap is then laid flat on the forehead; the fundus pointing upwards, the neck resting between the eyebrows. It is there steadily held by an assistant, while the surgeon, with ink, or at once with the knife's point, draws its boundaries. Thus defined, it is carefully dissected down, of uniform thickness, until the narrow part is reached; and then the incisions are carried to a greater depth, to insure an abundance of vascular supply. In no part of the wound is the pericranium interfered with; and, if possible, the flap should not be made to encroach upon the hairy scalp—for obvious reasons. The neck of the flap is made sufficiently long to admit of its being twisted, without serious interruption to the circulation; and, to facilitate this movement, the knife is carried lower down on that side to which the twist is to be made. A little time is allowed for the oozing of blood to cease; then the flap, having been twisted so as to bring the integument upwards, is adjusted to the rudiments of the old feature, carefully and accurately, by the requisite number of points of interrupted suture; and support is afforded to the flap beneath, by the lodgment of dossils of lint, so as to give that prominence and character which seem best suited to its new office of repair and imitation. The lower part of the wound in the forehead is brought together by suture, and may unite by the first intention; the rest is covered with water-dressing, and left to granulate. The flap adheres, in part by adhesion, in part by granulation; the stitches are cut away at the ordinary period; and the interior stuffing is changed from to time—medicated if necessary. Ultimately—in twelve or fourteen days, usually—the borrowed substance becomes firmly seated in its new abode; and then attention is directed to the connecting slip. If the ossa nasi have been left entire, with their integument, the apex and alæ only having been destroyed, the connecting slip may be divided and removed. A wedge-shaped portion is taken away by means of a narrow bistoury; and adjustment is effected with the integument beneath—made raw by the knife for reception. But if the ossa nasi have been lost, it is well to leave the medium of attachment uninterfered with; only securing its incorporation with the subjacent surface; for, by its continued presence, the want of prominence which the loss of the nasal bones could not fail otherwise to produce will be very much compensated. Besides, continued nutrition of the transplated flap will be fully secured, and its shrivelling by atrophy may be in a great measure prevented. If the prominence should threaten to be excessive, it may be reduced by compression suitably applied.

Fig. 70.



Plan of flap for a new nose, according to the original Indian method; columna, apex, and alæ being all made at once.

Fig. 71.



Plan of flap for new nose, as modified by Mr. Liston. The apex and alæ provided for; the columna to be brought, subsequently, from the upper lip.

Certain precautions are always to be attended to in such proceedings. As already stated, the flap should at first seem too large; if neatly fitting at the time, it is sure to prove insufficient afterwards. Twisting is effected very gently and carefully, lest strangulation ensue. Should engorgement occur, relief is to be obtained for the passively congested vessels, by punctures, or by drawing blood from the still raw edges. Erysipelas may supervene; if it does, the transplanted part need not be exempted from puncture or incision, if these be deemed necessary; for experience declares it to possess at least an equal tolerance of such remedial treatment as the original textures.

When peculiar circumstances render the ordinary operation impracticable, the flap may be taken from the hairy scalp, as practised by Dieffenbach; the hair having been previously removed by means of the bichloride of mercury in solution; and the flap being connected with a long narrow strip of the integuments of the forehead.

When consolidation of the new alæ and apex has been duly effected, formation of the columna is then proceeded with; according to the method first proposed by Mr. Liston.[1] The centre of the upper lip is found tumid and elongated; in consequence, removal of a portion of the redundancy would of itself be a considerable improvement; and when the portion so removed can be converted to the useful purpose of constituting a most efficient new columna, the expediency of the proceeding becomes very apparent.

"The inner surface of the apex is first pared. A sharp-pointed bistoury is then passed through the upper lip—previously stretched and raised by an assistant—close to the ruins of the former columna, and about an eighth of an inch on one side of the mesial line. The incision is continued down, in a straight direction, to the free margin of the lip; and a similar one, parallel to the former, is made on the opposite side of the mesial line, so as to insulate a flap about a quarter of an inch in breadth, and composed of skin, mucous membrane, and interposed substance. The frænulum is then divided, and the prolabium of the flap removed. In order to fix the new columna firmly and with accuracy in its proper place, a sewing needle—its head being covered with sealing-wax to facilitate its introduction—is passed from without through the apex of the nose, and obliquely through the extremity of the elevated flap: a few turns of thread over this suffice to approximate and retain the surfaces. The flap is not twisted round as in the operation already detailed, but simply elevated, so as to do away with the risk of failure. Twisting is here unnecessary; for the mucous lining of the lip, forming the outer surface of the columna, readily assumes the color and appearance of integument, after exposure for some time, as is well known. The fixing of the columna having been accomplished, the edges of the lip must be neatly brought together by the twisted suture. Two needles will be found sufficient, one being passed close to the edge of the lip; and they should be introduced deeply through its substance—two-thirds, at least, of its thickness being made superficial to them. Should troublesome bleeding take place from the coronary artery, a needle is to be passed so as to transfix its extremities. The whole surface is thus approximated; the vessels being compressed, bleeding is prevented; and firm union of the whole wound is secured. The ligature of silk or linen, which is twisted round the needles, should be thick and waxed; and care must be taken that it is applied smoothly. After some turns are made round the lower needle, the ends should be secured by a double knot; a second thread is then used for the other needle, and likewise secured. With the view of compressing and coaptating the edges of the interposed part of the wound, the thread may be carried from one needle to the other, and twisted round them several times; but in doing this, care must be taken not to pull them towards each other, else the object of their application will be frustrated, and the wound rendered puckered and unequal. Last of all, the points of the needles are to be cut off with pliers. No farther dressing is required. The needles may be removed on the third day; their ends are cleaned of coagulated blood, and, after being turned gently round on their axis, they are cautiously withdrawn without disturbing the threads or the crust which has been formed about them by the serous and bloody discharge. This crust often remains attached for some days after removal of the needles; and, besides forming a bond of union, is a good protection to the tender parts. Some care is afterwards required, from both surgeon and patient, in raising up the alæ, by filling them with lint—thus compressing the pillar, so as to diminish the œdematous swelling which takes place in it, to a greater or less degree, and repressing the granulations. It is, besides, necessary to push upwards the lower part of the column, so that it may come into its proper situation; and this is done by the application of a small round roll of linen, supported by a narrow bandage passed over it and secured behind the vertex."

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[1] Practical Surgery, p. 253.

Partial Restoration of the Nose.

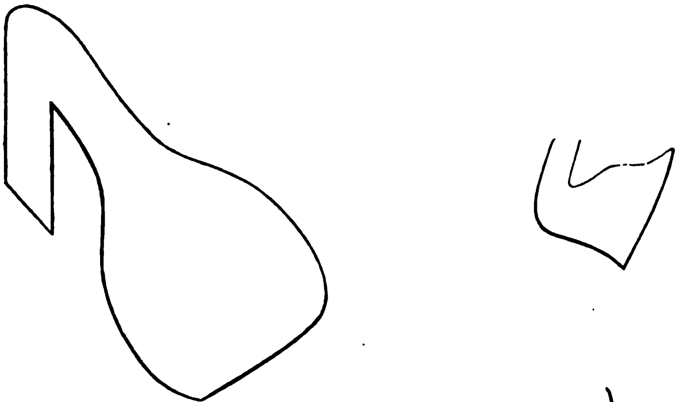
When a portion of either ala is destroyed, the deficiency may be readily supplied from the adjoining cheek; if there be the ordinary fulness there. The flap is raised, transplanted, and has its vascular supply maintained, by conducting the operation in the same way as for restoration of the whole organ. The wound in the cheek may, generally be approximated entirely; and, in consequence, may be expected to unite by the first intention.

The entire ala may be restored in a similar way. But if the cheek be either naturally spare, or already occupied by cicatrices, the flap must be brought from the forehead. An operation is performed, similar to that for restoration of the whole organ, but on a minor scale. When the ridge of the nose is long, it is well to make a suitable furrow in its centre—by incision—for reception of the long connecting slip; which, otherwise, finding itself but indifferently supported on the exterior of nasal integument, might fail to afford due nourishment to the flap, and induce its sphacelation. After union has occurred throughout the whole wound, the connecting slip may be raised from its temporary bed, and the raw edges of its site approximated; or it may be left undisturbed; according as circumstances may seem to indicate.

Loss of the apex and both alæ is supplied by a frontal flap; with or without lodgment of the connecting slip, according to the length of the nasal ridge.

The ridge itself, when deficient, may be restored by a frontal flap, very readily and efficiently; either by adapting a suitable portion to its surface, made raw; or by inserting a slip into a sulcus made for its reception. By cutting out the depressed portion, and approximating the margins of the wound by suture, depression may be removed, in some cases satisfactorily; but, in most, such an attempt would be followed by an elevation of the apex, causing a deformity little less unseemly than the original.

Fig. 72.



"The alæ of the nose, deficiencies in the upper, anterior, or lateral parts of the organ, in the forehead &c., may be supplied from the neighboring integument, on the same principle as the preceding repairs. In many of these operations the flap can be so contrived and cut out, as that it can be applied without its attachment being twisted. The form of such flaps is here given."—LISTON.

When the columna alone is deficient, the operation for its restoration is performed, as detailed at page 167.

Not unfrequently, the columna, and the integumental part of the alæ and apex, remain entire, while the cartilaginous texture has suffered more or less dilapidation; and the nose in consequence shrinks, falls inwards, and is much deformed. Autoplasty is not required to remedy this case. In some examples it is sufficient to divide carefully the abnormal adhesions within, to elevate the nostrils then to their normal level, and to maintain this elevation subsequently by suitable stuffing of the cavities. In other cases, however, such manipulation is found insufficient; and then it is expedient to approximate the cheeks, so as to force the nose into increased prominency; the original insertions of the alæ on the cheek having been previously detached, by subcutaneous incision. The organ, thus rendered movable, is transfixed at its base horizontally, by silver needles, which are made to perforate a piece of leather or wood, after emerging from the nose; and by twisting the extremities of the needles, on this exterior foreign substance, the due amount of approximation is effected and maintained.[1]

When there is both depression of the alæ and apex, and loss of the columna, the depression is first to be removed; and then a new columna is to be constructed in the ordinary way.

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[1] Fergusson's Practical Surgery, p. 454; also Association Journal, Feb. 18, 1853, p. 154.

But, in truth, no exact details can be established for any autoplastic or simply restorative operation on this organ; the proceedings must vary, in almost every case, according to its peculiar circumstances.

It is right further to state, that the majority of such operations come under the category of those of "complaisance"—undertaken under no absolute necessity, but rather to please the patient—proverbially prone to untoward casualties in the after-treatment. The flap may shrink or slough; ulceration may recur; erysipelas, phlebitis, pyæmia, may peril existence. And, at the same time, it is to be remembered that a very passable substitute for the lost organ may be adapted by the mechanic, without pain or danger.

For further information on Rhinoplastics, the student is referred to the Practical Surgery of Mr. Liston, and the writings of Dieffenbach—who, in this department, bade fair to rival the fame even of Tagliacotius. [See also Reports of Operations by Dr. J. M. Warren, in Boston Med. and Surg. Journal, vols. xvi, xxii, xxviii, and Am. Journ. Med. Sci. vol. xx; by Dr. Mütter, Am. Journ. Med. Sci. vol. xxii, and in Am. Ed. of Liston's Practical Surgery; by Dr. Pancoast, Operative Surgery.]

CHAPTER VII.

AFFECTIONS OF THE SUPERIOR MAXILLA.

Collection of Fluid in the Antrum.

The antrum is liable to become the seat of a chronic collection of fluid, whereby its parietes are expanded and attenuated, and its cavity much enlarged. The condition is ordinarily termed abscess; but it seems very doubtful if this appellation be accurately applied. The fluid may be puriform, but is seldom purulent. It is more like what is usually found in serous cysts; sometimes thin and serous, sometimes glairy, sometimes sanguinolent, sometimes puriform, not unfrequently mingled with more or less of solid curdy matter. The parietes of the cavity are not thickened by fresh osseous deposit, as in chronic abscess; on the contrary, they are simply expanded, becoming thin, and in some places perhaps deficient—the loss being supplied by membranous structure, contributed probably by the periosteum. In short, the morbid condition more resembles that of osteocystoma, than that of chronic abscess of bone (*Principles*, 4th Am. Ed. p. 378).

The symptoms are—uneasy sensation in the part; swelling of the cheek, which ultimately crackles on pressure, and may be felt to fluctuate—the parietes having become much attenuated; the palate may bulge considerably downwards; sometimes there is increased secretion from the corresponding nostril; and from the hanging and stiffness of the lip on that side, articulation may be interfered with. The change may be attributed to a slight and remote injury; or to the presence of decayed teeth in the corresponding maxilla; but, very frequently, there is no assignable exciting cause.

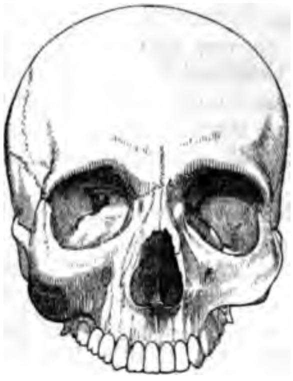
The remedy is by evacuation; and the aperture must be both free and dependent. An aperture sufficiently dependent may be formed in the corresponding alveoli, of the canine or first molar teeth; and sometimes a communication is found already established there, on removal of the decayed teeth or stumps. But such an opening is seldom if ever sufficiently free, when of spontaneous formation; indeed, sufficient space is not readily obtained at this part, even by operation. And it is essential that the opening shall be of some considerable size; otherwise the fluid will not escape by it; but will be retained by atmospheric pressure—as in the case of the narrow-necked bottle, which when filled with water, is suspended in an inverted position for barometric purposes. It is better to make an opening through the most dependent part of the attenuated parietes; above the first molars. The membrane of the cheek is incised there; and, by means of the same instrument—a strong bistoury—the parietes of the cavity may also be perforated in the greater number of cases. If the bone, however, prove thick and resisting, a pointed lever, as used for the extraction of decayed teeth, may be employed. An aperture having been made, of sufficient dimensions to admit the point of the little finger, through this the contents readily drain away. Besides, re-accumulation is effectually prevented; and, by pressure from without, return to the normal state by contraction is favored.

Abscess of the Antrum.

The lining membrane may undergo inflammation, with or without the application of external violence; and suppuration may ensue. The affection may be either chronic or acute. In the former event, the case will very much resemble the cystic enlargement just detailed. This, however, is of rare occurrence, and is usually unconnected with external injury.

Acute abscess generally results from violence applied, or from irritation communicated by decayed teeth or other affections of the gums. The symptoms are severe. With a considerable amount of constitutional disturbance, there are deep-seated and great pain, tension and throbbing, and swelling of the superimposed soft parts. Usually partial evacuation takes place, spontaneously, by the side of a tooth; with relief from the more prominent symptoms. Such imperfect evacuation and relief, however, are not enough; the operation, above the bicuspid teeth, as for emptying the indolent fluid collection, must be had recourse to. But, of course, in the first instance, attempts are made to forego the necessity of all operative interference, by timeously arresting the inflammatory process, if possible, ere matter has at all formed. When purulent accumulation has taken place, the artificial opening cannot be too soon established. For from the turgid state of the membrane, it is very obvious that no partial relief can be expected from spontaneous evacuation through the nasal aperture—as sometimes happens in the indolent collection of fluid.

Fig. 73.



Enlargement of the antrum, by accumulation of fluid within.

Polypus of the Antrum.

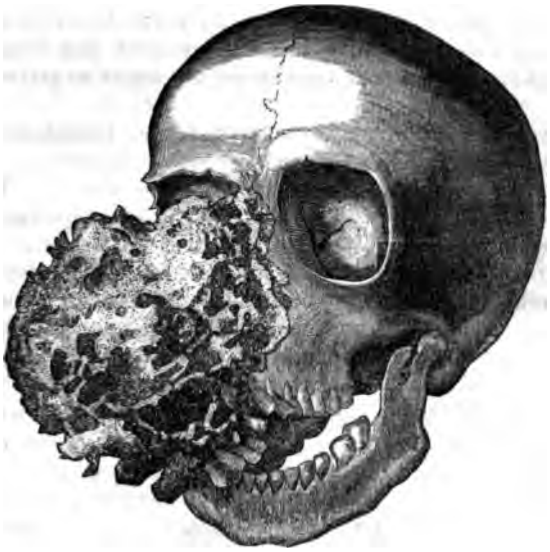
The lining membrane of this cavity, like that of the nostrils, may give origin to polypous formations. But the occurrence of benign polypi here is comparatively rare. The medullary formation is not uncommon; constituting the origin of osteocephaloma, as affecting this bone; and amenable to the ordinary rules of treatment (*Principles*, 4th Am. Ed. p. 424).

Did plain indications exist of the presence of a benign polypus—mucous or fibrous—within the antrum, it would certainly be our duty to expose the cavity, by suitable incision, from the mouth; with or without division of the lip; and to eradicate the morbid growth thoroughly. Such cases, however, are extremely rare.

Tumors of the Superior Maxilla.

Two forms of tumor are liable to occur in this bone; Osteosarcoma and Osteocephaloma. Tumors very different in themselves, and requiring very different treatment; the one early irremediable; the other capable of cure, at an advanced date, and after a large or even enormous size has been attained (*Principles*, 4th Am. Ed. p. 424).

Fig. 74.



Large Osteosarcoma of upper jaw; macerated, showing the osseous stroma. Still limited to the superior maxilla, in which it originated.—Howship.

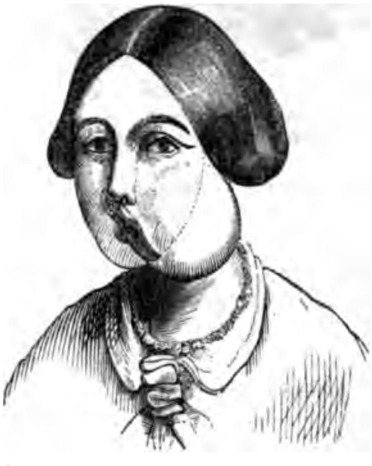
The osteosarcoma may reach a large size by external bulging, and by expansion of the bone; but, unless it degenerate in structure, it remains limited within the confines of the superior maxilla; and consequently, by removal of that bone alone, the whole of the diseased formation may be taken away. The swelling projects into the fauces, into the mouth, and outwards on the cheek; the main protuberance is in the last-named direction, interfering with articulation, mastication, and vision; a thin serous discharge escapes by the mouth, seldom bloody, and seldom offensive; and the general health may be hale in all respects. The remedy is excision of the superior maxilla; and this, though a severe and somewhat difficult operation, may be fearlessly undertaken, even in the most advanced cases of this disease—if genuine; experience having proved that the issue of such operations is almost invariably prosperous.

The osteocephaloma may be of original formation, or may be the result of osteosarcoma degenerated. When of the former character, the diseased formation has extended beyond the limits of the superior maxilla, ere any considerable prominence has appeared externally. The outward tumor may be yet trifling, while the mouth and fauces are completely occupied, and the base of the cranium hopelessly involved. The system, too, is already worn by malignant hectic. In such cases, we cannot—by excision of the superior maxilla, the palatine bones, and the malar—hope to take away the whole of the tumor; a portion remains, deep-seated and inaccessible; from this, reproduction of a tumor, soft, fungated, and bleeding, takes place; and a most disastrous issue is precipitated. Or, not improbably, the already much enfeebled system speedily sinks under the immediate effects of the operation, ere ever a new production has had time to form. In short, while we may perform excision of the upper jaw with the best prospect of success, even at a late period of the case, in osteosarcoma; we ought to refrain from operation in all examples of osteocephaloma, excepting those in which we are satisfied that the disease is yet recent, and limited to the bone in which it began—and such cases are very rare.

Extirpation of the Superior Maxilla.

The patient is seated firmly on a chair, or reclines on a table with the head and shoulders considerably elevated; for so the manipulations of the surgeon are facilitated, and the outward escape of blood is favored. As elsewhere stated (*Principles*, 4th Am. Ed. p. 660), my own impression is, that anæsthesia by chloroform is at least of doubtful propriety here. The experience of others, however, among whom I may place the high authority of Mr. Lawrence, testifies that this important agent may be employed, under due precaution, even here with perfect safety.

Fig. 75.

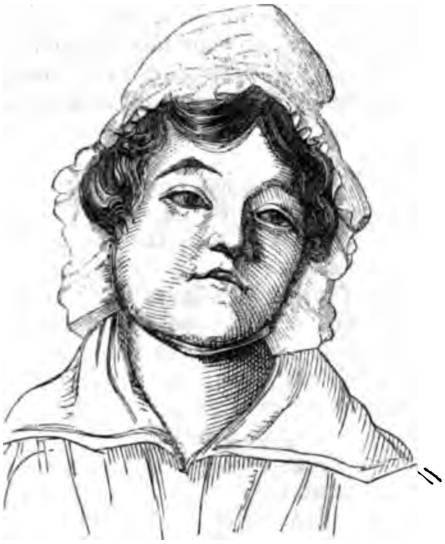


Tumor of the upper jaw; showing the lines of incision for removal.

used, every care must be taken to prevent the main risk, namely, ıhyxia by accumulation of blood in the air-passages.

The jaw having been made clear of teeth at the point where section ntended to be made, a strong bistoury is inserted near the inner cor- : of the eye, over the nasal process of the superior maxilla, and is ıught down to the mouth; cutting the lip in the mesial line, and dis- ting the ala of the nose from its basis. The knife is again entered ır the external angular process of the frontal bone, and carried iquely downwards to the angle of the mouth; dividing the whole ckness of soft parts. The flap indicated by these two incisions, is ın dissected upwards off the tumor; and is held raised by an assistant. e orbital contents are separated from the bone, on their lower aspect; l are gently elevated and protected by a flat copper spatula, which is o retained by the assistant. The soft palate is incised in the mesial e, correspondingly with the wound of the lip; and, by cross cutting, ı pendulous velum of the palate is separated from the doomed parts— w isolated, so far as the soft textures are concerned. By a small saw stronger and longer than what is ordinarily sold as Hey's—the union ween the maxillar and malar bone is severed. By the same instru- nt the alveolar process is cut through, at the part exposed by the ial wound; and a groove is also made in the palatine process, at the

Fig. 76.



Portrait after removal of the upper jaw, for osteosarcoma. An example of how little deformity may in some cases remain.

rt incised. A pair of stout and long bone-pliers may then be used to nplete the section at this part; one blade resting in the palatine and 'eolar groove, the other passed into the corresponding nostril. If ch an instrument be not at hand, however, the section may be com- ıted readily enough by means of the saw alone. The nasal process is severed by the ordinary cutting pliers. And now, by pressing the tumor downwards it is dislodged from its connections; while complete separation is readily effected by touching with the knife those soft parts which require its edge. The velum of the palate, formerly separated, is carefully preserved—and, if possible, also the palatine plate of the palate bone. One or two vessels, hanging in the deep wound, will probably require ligature; and the facial vessels, which during the operation were restrained by the fingers of an assistant, are also secured. The amount of deep bleeding is often but slight; the vessels being torn, not cut, during evulsion of the tumor. The vacant space, having been cleared of coagulum, is filled with lint; and over this the flap is replaced. Both incisions are then brought together with great accuracy, by means of the twisted and interrupted forms of suture; treatment is conducted for adhesion; and, generally, this does not fail to occur, in almost the entire extent of the facial wound. The deep cavity of course inflames and suppurates. The lint loosens, and is brought away. A less amount of dressing is daily renewed, medicated with a weak solution of the chlorides; granulation advances, and cicatrization is in due time obtained. In some cases, a marked deficiency remains; and this may be remedied by the skill of the dentist. But in other cases, the deficiency is wonderfully atoned for, by Nature's effort alone; partly by the formation of new matter, partly by contraction and accommodation of the old.

When the tumor is of large size, the malar bone is encroached upon, and has to be taken away along with the maxilla. In such a case, a third incision is made along the zygoma, terminating in the upper part of that which passes from the outer corner of the eye to the angle of the mouth; the zygomatic and orbital processes being divided by the bone-pilers.

If the tumor be small, one incision may suffice—that from the outer corner of the eye to the angle of the mouth; it being quite possible to expose the parts sufficiently, by raising the triangular flap while the lip and front-face are retained entire.

Dieffenbach's mode of procedure is as follows:—Having made the central incision by the side of the nose, the knife is carried across beneath the eye to the temple; and the flap thus indicated is dissected off. This admits of a thorough exposure of the tumor; subsequent deformity by the cicatrix is comparatively slight; and paralysis from division of the facial nerves will probably be avoided.

If any doubt should occur to the surgeon as to the solidity of the growth, an exploratory puncture should be made in the direction of the antrum, previous to operation. For, excision of the upper jaw is rather too severe a remedy in the case of mere distension of the antrum by accumulation of fluid.

See Bibliography of Diseases of Bones in Principles of Surgery; also Lizars, London Medical Gazette, vol. v, p. 92; and System of Anntomical Plates, part ix, Edin. 1826 (where excision of the superior maxilla is first proposed). Blandin, Gazette Medicale de Paris, vol. ii, 1834. Guthrie, Medical Gazette, vol. xvii, 1835. O'Shaughnessy on Diseases of the Jaws, &c., Calcutta, 1844. Liston's Practical Surgery, last edition. Liston on Tumors of the Face, Med. Chir. Trans. vol. xx. Dieffenbach's Operative Surgery, Leipsic, 1845. Medical Times, 24th May, 1851.

CHAPTER VIII.

AFFECTIONS OF THE FACE.

Wounds.

WOUNDS of the face are apt to bleed freely, and usually require deligation of the vessels. Coaptation should be most carefully effected, and adhesion courted, in order to avoid deformity by cicatrization, as much as possible. Transverse wounds may interfere unpleasantly with the parotid duct; and, by division of the branches of the portio dura, may paralyze the cheek, at least for a time. After cicatrization, resumption of the nervous function may be expedited by friction.

Warts.

Warts not unfrequently form on the integument of the face. They should not be allowed to remain: for, by the time old age has supervened, they will be found either already degenerated, or prone to become so. It is well to remove them early by the ordinary means (*Principles*, 4th Am. Ed. p. 356) while they are yet simple.

Erysipelas.

Erysipelas seldom assumes the phlegmonous form in the face. Punctures, consequently, suffice for abstraction of the blood, and relief of tension. They may be made freely; for the cicatrices leave no unseemly trace. After disappearance of the main attack, the patient must be carefully watched for some days; reaccession, with secondary abscess, being very apt to occur in the areolar tissue of the lower eyelids. As in erysipelas of the scalp, cold, and other repellent applications, should never be employed.

Spasm.

Spasmodic twitching of the muscles on one side of the face—the orbicularis oculi, the levators and retractors of the upper lip, and the corresponding movers of the nose—is an unpleasant affection of no uncommon occurrence. Often it will yield to general treatment; more especially to rectification of the primæ viæ. Sometimes, also, patient counter-irritation is of use, directly over the part; and probably the preferable mode of applying this, is by rubbing on nitrate of silver in substance, so as to vesicate. In chronic and obstinate cases, tenotomy has been had recourse to.[1] In one example, permanent cure followed subcutaneous division of the zygomatici, the levator anguli oris, a portion of the orbicularis oculi, and the depressor alæ nasi. In order to restrain hemorrhage, and consequent ecchymosis, likely to result from such a cross wound of the face, accurate pressure is necessary immediately after withdrawal of the knife.

Neuralgia.

Neuralgia affecting the branches of the fifth pair of nerves is termed *Tic Doloureux;* at once, unfortunately, one of the most distressing and most unmanageable affections to which the human frame is liable. The treatment is supposed to fall within the peculiar province of the physician; and consists in carrying out the general principles on which the management of neuralgia is ordinarily conducted (*Principles*, 4th Am. Ed. p. 549). At one time the surgeon's aid was not unfrequently called upon; division of the trunk of the affected nerve being supposed likely to afford at least an alleviation of the distressing symptoms. Experience has proved, however, that such an operation is in most cases inexpedient; the relief, if any, is but partial and temporary; and the neuromatous enlargements, which form on the truncated extremities of the nerve, are likely to produce ultimate aggravation. The operation, in truth, may be the means of converting an example of neuralgia unconnected with structural change, in any part of the nerve, into a worse form, dependent on structural change, not only considerable but probably irremediable. Sometimes the operation has proved successful upon one nerve, only to drive the neuralgia to another—perhaps inaccessible. Very seldom does it affect a complete cure.

Tumors of the Cheek.

Tumors form in front of the ear, and are of various kinds. They may be simple, fatty, fibrous, or cystic. Calcareous formations, too, are not unfrequent; the earthy matter being deposited in the stroma of a chronically enlarged lymphatic gland. In removing such growths by the knife, the greatest caution should guide the movements of the hand; lest the branches of the portio dura be cut across, and paralysis of the cheek ensue; and lest by division of the parotid duct, salivary fistula be established. In order to meet such indications, the dissection should be proceeded with in the direction of the endangered parts—horizontally; contravening the general rule of cutting in the direction of subjacent muscular fibre.

Tumors of the parotid are rare, fortunately. For this gland is so situated as to render extirpation of it, entire, even in the healthy state, an operation of extreme difficulty. If it be the site of a benign tumor, of no great size or duration, removal may be attempted. The dissection will be deep and difficult; and, after every care, a portion of the morbid structure is likely to be left behind; but it is quite possible that reproduction may not occur. Malignant formations, however, are uniformly let alone; for in their case reproduction is certain, if any portion of the original growth, however slight, be permitted to remain.

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[1] Dieffenbach on Division of Tendons and Muscles, Berlin, 1841, p. 315.

Tumors over the parotid are comparatively frequent. They displace the subjacent gland, cause it to shrink by absorption, and occupy its place. Their extirpation can be effected both readily and safely.

Sinus of the Cheek.

Patients frequently present themselves under the following circumstances. They are adolescents, or recently adult; and are more frequently female than male. Many months previously, a phlegmon formed on the lower part of the cheek, over the body of the lower jaw; suppuration took place; copious discharge has continued ever since; and though many and various remedial means have been employed, cicatrization, or even marked amendment, has never been obtained. There is a weak sinuous ulcer, with a pouting external surface; and the surrounding integuments are swollen and discolored by passive congestion; or there is a puckered and retracted attempt at a cicatrix, from which matter more or less copiously escapes. In the great majority of such cases, if not in all, the exciting and retaining cause is to be found within the mouth. Opposite, or nearly opposite the affection of the cheek, a decayed tooth or stump will be found, probably imbedded in a diseased gum. And on removal of this—and not until then—will the sinus and ulcer be brought to heal. Without extraction of the offending tooth or teeth, the most energetic and sustained practice may be put in force against the cheek, without success. After extraction, healing may occur even without any remedial means having been applied directly to the part.

Salivary Fistula.

In consequence of wound or ulcer, the duct of the parotid gland may open externally on the cheek. And by outward discharge through the fistulous aperture, not only are deformity and inconvenience occasioned, but also a serious loss is sustained of secretion very valuable in the processes of mastication and digestion. The principles on which a cure is to be attempted are very simple; namely, the establishment of an internal opening, by which the saliva may be poured into the mouth, and saved; and the shutting up of the external aperture whence this fluid has previously run to waste. A puncture is made through the mucous membrane, communicating with the duct's cavity; and the permanency of this new passage is secured, by the lodgment of a suitable foreign substance—either left there for some days, or introduced at frequent intervals. The external aperture, having been made raw in its edges, is shut by means of a point of twisted suture. Adhesion may take place; if not, subsequent contraction is induced by the application of a heated wire, at long intervals. Autoplasty may be of use, in those cases in which there is much loss of substance, and in which the ordinary means of effecting closure have failed.

Fracture of the Malar Bone.

This accident is rare. The deformity is considerable, and unfortunately not easily remedied; as in the following example:—A lad, aged eighteen, was struck on the face by a full blow from the fist of a heavy athletic man. The zygoma had given way, and also the union between the malar bone and superior maxilla. The former bone had been driven much down, giving a remarkably sunk appearance to the face, with deficiency of orbital margin. By examination from the mouth, it was also apparent that the roof of the maxillary antrum had been broken and depressed. In addition to the deformity, the patient complained of much pain; there was a numbness of that side of the mouth; and considerable difficulty was experienced in attempting to close the jaw, the redundant soft parts of the cheek lodging between the teeth. By pushing upwards with the finger-points, insinuated from behind, the malposition of parts was in some degree rectified; but still considerable displacement and deformity remained.

Reich, Dissert. de Maxille Superioris Fractura, Berol. 1822. Cloquet, Memoire sur les Fractures par Contrecoup de la Machoire Superieure, Paris, 1820.

CHAPTER IX.

AFFECTIONS OF THE LIPS.

Harelip.

s term is applied to congenital fissure of the lip; the part, so de-
l, being supposed to have a resemblance to the natural develop-
of the hare. In general, there is a strong wish, on the part of the
s and friends, to trace the untoward result at birth to some sinis-
pression made on the mind of the mother during utero-gestation—
hat success it were more curious than useful to inquire. The
on may be single or double, simple or complicated.
gle Harelip consists of a fissure, extending through the whole
ess of the lip, usually situate on one side of the mesial line, and
partially dividing the lip, or extending completely into the cavity
nostril. When the affection is both simple and single, there is no
deformity in the mouth; the hard and soft palates are entire and
leveloped, and the gums are normal. Deformity is great, how-
even in the simplest form; and the functions of the parts are also
interfered with. The only remedy is by operation; making raw
lges by incision, approximating the fissure accurately at every
and securing union by adhesion. The preferable period for per-
g this operation, probably, is after the child has passed the second
By this time the trying process of dentition has usually gone
nd there is consequently a better tolerance of pain and loss of
than at an earlier period. Also, at this age, the patient, though
to its utmost, is yet easily managed and controlled; and the pro-
is manifestly favorable to the due advancement of articulation,
e important educational results which follow thereon. For a like
as in extirpation of the upper jaw, anæsthesia is here somewhat
lous; yet, with care, it may be employed safely enough—the
t's position being altered, occasionally, so as to obviate the risk of
g by blood. The child, rolled firmly up in a linen sheet—mummy-
with its arms by its side, is held on the lap of a nurse or an
nt, and has its head secured between the knees of the surgeon,
seated on a chair in front of the patient and nurse. The free
of the lip, on one side of the fissure, is taken hold of by the
and thumb, and put on the stretch. A narrow and straight sharp-
d bistoury is then inserted at the upper or nasal angle of the de-
y, and carried steadily downwards, after transfixion, so as to leave
th cut surface on the fissure's margin. The like is done on the

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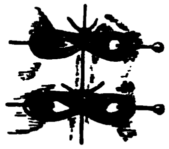
operation has been successfully performed, eleven hours after birth.—Ranking's
ect, vol. v, p. 249.

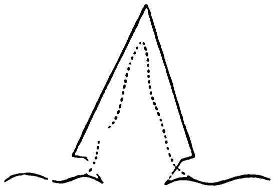
opposite side. But in neither case is the section made complete. Near the prolabium the knife is arrested and withdrawn, and the two flaps are left pendent. The lip is temporarily brought together, and an estimate is made of how much of the lower part of these flaps should be retained, in order to fill up completely the notch which is otherwise so apt to remain at the prolabium; and, this having been ascertained, the necessary abbreviation of the pendent flaps is made by knife or scissors. The wound is then finally closed, accurately, by points of twisted suture, in the same way as in the operation for restoring the columna nasi. For this modification of the operation, in order to obviate the prolabial notch, we are indebted to M. Malgaigne. If a pouting redundancy should be found, after cicatrization, it may easily be reduced to the proper outline, by knife or scissors if need be; but, in general, absorption will render all secondary interference unnecessary. To assist the needles in their work of coaptation, pressure may be made on each cheek, bulging the lip forward, by means of a kind of truss made for the purpose. Some surgeons, indeed, trust to this solely, after the incisions.

Fig. 77.



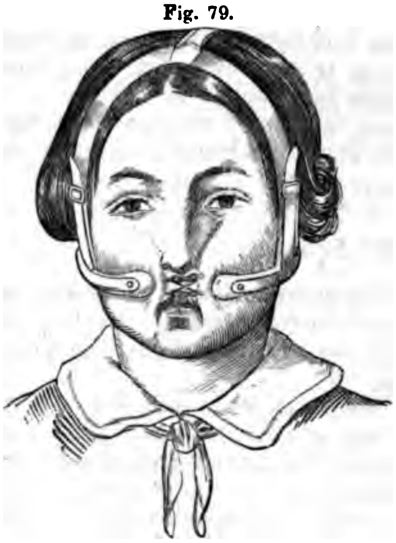
The twisted suture.

Fig. 78.



Malgaigne's operation. The dotted lines mark the fissure.

Fig. 79.

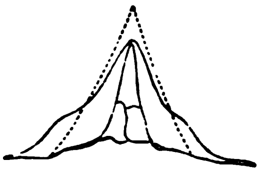


[Instrument recommended by Mr. Fergusson.]

In *double harelip*, there is a fissure extending from each nostril, and usually complete. The intermediate portion of lip may be fully developed, or it may be short and deficient. In the one case, two lines of wound are necessary—the ordinary operation being applied to each fissure; in the other, a single approximation will suffice—as is sufficiently illustrated in the diagram (Fig. 80).

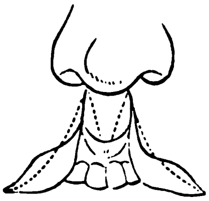
Complicated Harelip.—Complication attends on the double form more frequently than on the single. The hard and soft palates may be cleft. Or the gum is in an abnormal state; projecting forwards between the fissures, sometimes adherent to the apex of the nose, and presenting teeth growing viciously. The abnormal state of the palate makes no difference in the operation on the lip; except to expedite its performance, in the hope that the traction so exerted may have some good effect, in favoring diminution of the palatine chasm during progressive development of the parts. In the case of projecting gum, it is usually expedient to begin the operation by removing the faulty part, on a level with the normal gum, by means of bone-pliers; and then to complete the procedure in the ordinary way. In some few cases, repression of the prominence may be effected, by adapting a springed instrument calculated to exert the necessary amount of pressure.

Fig. 80.



Simple harelip. The dotted lines mark the incisions, as in the ordinary operation.

Fig. 81.



Single operation for double harelip. The dotted lines mark the incisions, as ordinarily practised.

Ulcers of the Lips.

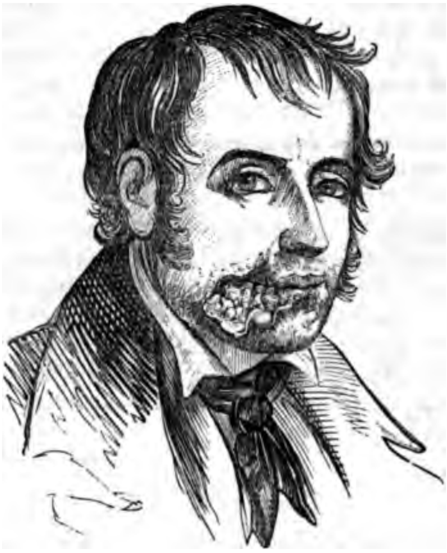
The lips are liable to ulceration of the ordinary kind; induced by exposure to weather, irritation of tartar or decayed teeth, gastric disorder, external injury, or direct application of an irritant cause. The prolabium is the part most frequently involved.

Treatment is begun by removal of the cause, when that is apparent; avoiding atmospheric exposure, subduing excitement caused by external injury, removing sources of irritation from the gums, discontinuing the habitual use of a short pipe, correcting the digestive organs, &c. Then applications are made to the sore, according as its appearance may seem to require; and nitrate of silver, either in substance or in solution, is found to be the application most generally useful—the ulcer usually partaking more or less of the irritable character (*Principles*, 4th Am. Ed. p. 223). Throughout the treatment, it is of great importance to secure rest of the part as much as possible. In the child of strumous habit, ulceration of the prolabium and lining of the upper lip, near its centre, is very apt to occur, with much swelling of the part; and in such cases the binding of a riband tightly over the lip is found to be very beneficial—securing comparative rest of the part, and promoting discussion of the swelling by pressure.

Malignant Ulcers of the lips are unfortunately by no means rare; but are peculiar to the advanced in years, as *cancer* usually is; and the lower lip is much more frequently affected than the upper. The disease may commence by carcinomatous formation of a warty character, or may exhibit at once the condition of cancer (*Principles*, 4th Am. Ed. p. 284).

The most common inducing cause is the habit of smoking with a short clay pipe; which becomes hot, and irritates the prolabium—daily, or many times a day. The only remedy is by free and early removal of the diseased part; while the disease is yet limited, and no involvement of the lymphatics is apparent. For superficial, suspicious sores, affecting the mere prolabium, escharotics may suffice; nitric acid, nitrate of mercury, chloride of zinc, or potassa fusa—freely applied. But when other textures are involved, the knife alone is worthy of confidence.

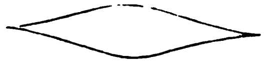
Fig. 82.



Cancer of the lip. The disease too extensive for any conservative operation.

When the affection is mainly on the surface of the lip, the whole may be taken away, and yet with very little deformity. By two elliptical incisions, the diseased space is included; the knife being entered in the middle of the prolabial space, and made to pass first on the integumental, and then on the mucous aspect of the disease. The morbid structure, thus marked, is carefully dissected out; and then the saved integument and mucous membrane are brought together by points of interrupted suture.

Fig. 83.



When the disease is more extensive, and the lip lax, it is yet possible both to remove the diseased part satisfactorily, and to prevent any great deformity. The including incisions are made in the form of the letter V, the apex pointing downwards; and with care taken that the good general rule is not transgressed, of taking away a border of apparently sound texture along with the truly carcinomatous formation (*Principles*, 4th Am. Ed. p. 287). The wound is approximated and secured, by twisted suture; as for harelip.

In not a few cases, however, almost the whole surface of the lip is in-

ved, the disease at the same time extending deeply towards the chin.
der such circumstances, we have but one paramount indication to
fil; namely, complete excision of the diseased part; and this is un-
npromisingly affected by a free sweep of the knife. Approximation
ot attempted. But the part is left to granulate and heal, as ordinary
purating wounds do. And sometimes the ultimate deficiency of lip,
er such an operation, proves much less than might have been antici-
ted; partly on account of formation of new matter, but mainly by
ilience and centripetal movement of the old textures.

The lower lip, when destroyed by carcinoma, may sometimes be re-
red in great measure by incision and elevation of the adjacent parts,
hout transplantation of flaps; as has been practised by Blasius, Dief-
bach, Serre, Syme, Lawrence, and others.[1] The operation is thus
cribed by Mr. Syme, in a case in which removal of the cancer and
toration of the lip was done at the same time: "Two incisions were
de from the angles of the mouth, so as to meet at the chin, and remove
whole of the morbid part in a triangular form. The lines *a b* and *b c*
ng supposed to represent these incisions, I cut from the point *b* out-
rds and downwards, on each side to *d* and *e*, in a straight direction,
l then, with a slight curve outwards and upwards, to *f* and *g*. The

Fig. 84.

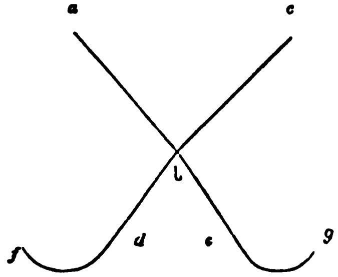
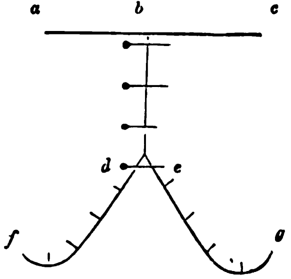


Fig. 85.



ps *a b d f* and *c b e g* were next detached from their subjacent connec-
ns, and raised upwards, so that the edges *a b* and *c d* came into a hori-
ntal line; while those represented by *b d* and *b e* met together in a ver-
al direction, and the lateral extensions to *f* and *g* allowed sufficient
edom to prevent any puckering or overstraining. The respective sur-
es were lastly retained in contact by the twisted and interrupted
ure; four points of the former being inserted in the middle line from
lip downwards, and the same number of the latter in the curved por-
n on each side. The wound then presented the appearance shown by
g. 85. It healed entirely by the first intention."

Cancrum Oris.

This is an example of Sloughing Phagedæna (*Principles*, 4th Am. Ed.
227). It originates in the mucous membrane of the lip or cheek, and

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[1] See Blasius, Klinischen Zeitschrift, Halle, 1836. Dieffenbach, Handbuch der Plastichen
rurgie, Berlin, 1838. Serre, Traité sur l'Art de Restaurer les Deformités de la Face,
is, 1842. Syme, Monthly Journal, March 1847, p. 642.

extends sometimes both rapidly and far, presenting the usual characters of that class of sore. It is almost exclusively met with in the ill-fed, ill-clothed, and ill-housed children of the poor, in densely populated towns. But in any child of weakly habit it may be induced, by imprudent mercurialism. The constitution sympathizes greatly; in the form of irritative fever, tending to the typhoid character. Treatment consists in amending the outward condition of the patient, if possible, by change of air, ventilation, &c.; rectifying the primæ viæ, by studiously avoiding all mercurial medicines; carrying out the active local treatment suitable to this form of sore (*Principles*, 4th Am. Ed. p. 228); and administering internally the chloride of potass—found to be a very appropriate alterative, in the dose of from one scruple to two scruples in the course of twelve hours. In the worst form, nourishment, tonics, and even stimuli may be imperiously demanded, to prevent sinking. And if the patient survive, the loss of substance will probably be such as can be remedied only by a determined autoplastic operation.

Cheiloplastics.

When the lip has been lost, either entirely, or in its greater part, in a patient otherwise of tolerable health, and not far advanced years, restoration by autoplasty may be contemplated. The part may have been destroyed by wound, sloughing, or intractable ulceration. In the last-mentioned case, we must be very careful not to attempt the engrafting of a substitute, until all ulcerative tendency has for some time wholly ceased—for very obvious reasons. After removal of truly cancerous disease, restorative interference is seldom expedient; unless by the peculiar arrangement of incision already spoken of.

The autoplastic operation is conducted on the same principles as for restoration of the nose. A flap, of suitable form and dimensions, is brought from beneath the chin. A connecting slip is left at the symphysis; there gentle twisting is made, so as to bring integument to the surface; the part is secured in its new site by suture; and, by the like means, a portion of the submental wound is approximated—the rest being left to heal by granulation. After adhesion of the flap is completed, the mental slip of attachment is divided, and smoothed down, by the bistoury.

See Dieffenbach, &c., as in the footnote of the former page. Liston's Practical Surgery. On Cancrum Oris, See Marshall Hall, Lancet, 1839–40, p. 409. Cycl. of Pract. Surgery *sub voce*. Hunt, Med. Chir. Trans. vol. xxvi. Also Lancet, No. 1023, p. 60.

CHAPTER X.

AFFECTIONS OF THE PALATE.

Congenital Deficiency.

EXTENSIVE deficiency of the *hard palate* is with difficulty remediable. Mitigation of the deformity and inconvenience may be effected by the dentist; a metallic plate being fitted into the chasm, on completion of the part's development. Also, something may be done by surgery; as recommended by Dr. J. M. Warren. The soft parts, having been carefully dissected off the bony arch, are brought together by suture, after the edges of the gap have been made raw. What filled the arch will probably meet readily on a plane surface; but should difficulty be experienced, further relaxation may be obtained by dividing the anterior pillars of the soft velum.[1]

A mere fissure of the hard palate may disappear spontaneously, during the progressive development in adolescence. And if the mucous membrane should be slow in closing over, this process may be expedited by occasionally applying a heated wire, or by raising and approximating the raw edges.

The *soft palate* may be fissured, alone. Then, if the want of substance be not great, we have it in our power to attempt remedy by operation. Three circumstances, however, are essential, as preliminaries to the attempt. There must be no great deficiency, otherwise traction in approximation will be considerable, and adhesion will almost certainly fail. The patient must be of adult age, or nearly so; great steadiness and self-control being indispensable on his part, both during the operation and afterwards. The patient should also be of sound system, and in good health; so as to afford every possible facility to the occurrence of adhesion in the wound. And unless a concurrence of these circumstances can be obtained, the prudent surgeon will refrain from interference.

The operation is termed *Staphyloraphe*, or *Velosynthesis*. It consists of three distinct parts: preparation of the velum, paring of the edges, and approximation of the fissure by suture. The first part requires some considerable time for its completion. For weeks before the actual operation, the patient accustoms himself to open his mouth wide, and to retain it so, steadily and enduringly—with no effort at deglutition of saliva: and he also seeks to reduce the irritability of the parts, by frequently touching them with his finger, or otherwise. The nature of the operation is fully and candidly explained to him, and his willing co-operation secured. Then he is seated before a good light, with the mouth widely opened, and the edges of the fissure are made raw, by a narrow sharp-pointed bistoury, used as in harelip; a volsella being employed to seize the uvular extremity, and so to make the part tense during incision.

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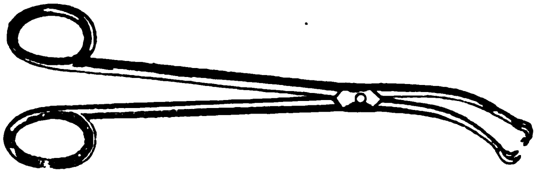
[1] New England Quarterly Journal of Medicine and Surgery, April, 1843.

Fig. 86.

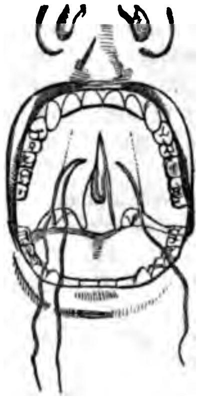


[Volsellum. (From Fergusson.)]

This completes the second part of the operation. Some time is now allowed to intervene, in order that the oozing of blood may cease; and it is well to give some simple nourishment—it being obviously important to avoid the effort and movement of deglutition for some time after approximation has been effected.

The third part of the procedure consists in bringing the wound into accurate apposition at every point; diminishing the strain on the sutures, by lateral and parallel incision of the mucous membrane; and keeping the part in a state of as complete quietude as circumstances will possibly allow. Approximation is not made immediately after incision, as already stated; it being obviously of importance to avoid the irritation and involuntary movements of the palate, which the trickling of blood would not fail to produce. But bleeding having wholly ceased, there is no necessity for further delay. The necessary number of sutures are passed; and may be secured either by the ordinary knot, or by passing the oral ends through a soft metallic bead, running this up to the line of wound, and clasping it on the threads there by means of firmly pointed forceps. Not a few instruments have been contrived for facilitating the sewing department in this operation—undoubtedly one of great difficulty; but it is probable that the curved needle in a fixed handle—as used for deligation of vascular tumors (*Principles*, 4th Am. Ed. p. 557, Fig. 209, b)—will be found quite suitable in experienced hands; or a short needle, very much curved, may be conveniently enough passed by means of a *porte-aiguille.*

Fig 87.



Plan of Staphyloraphe. The double ligature in the act of being drawn. The dotted lines mark the liberating incisions of the mucous membrane.

When approximation has been completed, a longitudinal incision is made on either side of the palate, through the anterior mucous membrane; so as, by permitting expansion at the cut part, to diminish traction on the line of union. Absolute starvation is not desirable. But simple farinaceous food is sparingly and carefully administered from time to time; the patient being as passive as possible in the act of swallowing. And the ordinary constitutional treatment, favorable to the occurrence of adhesion, is of course rigidly enforced. Not a little

›nial is necessary, on the part of the patient, to avoid the oft-occur- xcitements to coughing, hawking, and swallowing; compliance with would have a manifestly unfavorable effect upon the wound.

. Fergusson has introduced a very ingenious modification of the ıry operation; obtaining steadiness and quietude of the parts ope- on, by means of myotomy. Looking on a split palate, from the ı, the parts are seen hanging quiet in the fauces, with a distinct ıl gap in the velum. If the flaps be touched, they will be raised ·ds, by the action of the levatores palati muscles. If a stronger lus be applied—as by the rude touch of a finger—"each flap is ly drawn upwards and outwards, and can scarcely be distinguished the rest of the parts forming the sides of the nostrils and throat;" ıis is done by the action of the palato-pharyngei muscles, added to ·f the levatores palati. On exciting the parts situated more pos- ly, "as in the second act of deglutition, the margins of the fissure rced together, by the action of the superior constrictor muscle of ıarynx." The main opponents of approximation in staphyloraphe ıus shown to be the levatores palati and palato-pharyngei. And 'ergusson's operation is planned so as to divide and temporarily

Fig. 88.

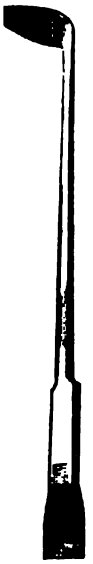
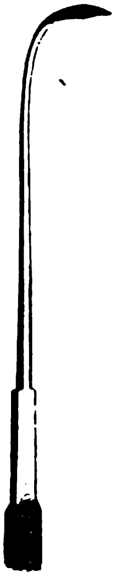
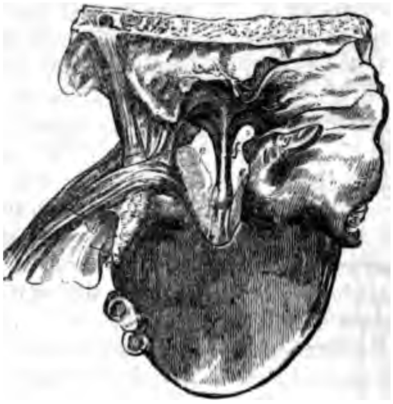


Fig. 89.



ı.88, 89. Knives employed by Mr. Fergusson.]

Fig. 90.



[This drawing represents the Posterior Nares and upper surface of the Soft Palate. *a.* The levator palati; the dark line shows where it should be cut across; the inner bundle of fibres of the palato-pharyngeus forming the posterior pillar of the fauces; the black line indicates the place for division. *c.* The palato-glossus with the place for incision, if one should be deemed necessary. The tonsil lies between these two muscles. *d* The tensor palati, the cartilaginous extremity of the Eustachian tube is in front of this letter. *e.* The posterior extremity of the inferior turbinated bone. *f.* The septum. *gg.* The uvula on each side stretched apart. (From Fergusson.)]

yze these muscles. "With a knife, whose blade is somewhat like oint of a lancet, the cutting edge being about a quarter of an inch tent, and the flat surface being bent semicircularly, an incision is about half an inch long, on each side of the posterior nares, a little ı and parallel with the palatine flaps, and across a line straight downwards from the lower opening of the Eustachian tube. By this incision—placed about midway between the hard palate and the posterior margin of the soft flap, just above the thickest and most prominent part of the margin of the cleft—the levator palati muscle on each side is divided, just above its attachment to the palate. Next, the edges of the fissure are pared with a straight blunt-pointed bistoury, removing little more than the mucous membrane. Then, with a pair of long blunt-pointed curved scissors, the posterior pillar of the fauces is divided, immediately behind the tonsil; and, if it seems necessary, the anterior pillar is cut across too; the wound in each part being about a quarter of an inch in extent. Lastly, the stitches are introduced. . . . Or, it may be found more convenient to divide the palato-pharyngeus first, next, the levator palati, and then to pare the edges when the muscular action has been taken off."[1] When the pared edges look thin, it may be well to increase their breadth by applying the curved knife so as to split the margins to a slight depth; so rendering the occurrence of satisfactory union more probable.

By another mode the split palate may be made to close. And to M. Cloquet we are indebted for the skilful application here of the principle of contraction in the healing of burns. A cautery is applied to the commissure of the split, at suitable intervals, till, after many burns, the space is gradually obliterated. Long time is necessarily occupied in the work; but the means are neither painful nor hazardous, and the result though slow is sure.[2]

Ulcer and Exfoliation of the Palate.

The lining membrane of both the hard and the soft palates is liable to ulceration, from ordinary or specific causes. The most intractable, and not least frequent examples, are those which are connected with the mercurio-syphilitic taint of system. In such, constitutional treatment is all-important; the local applications varying, according to the characters of the sore.

Exfoliation of the hard palate, not unfrequently complicated with caries, and necessarily accompanied with ulceration of the corresponding mucous membrane, is seldom if ever found to occur except when mercury has been freely administered. Again, treatment is mainly constitutional. Locally, separation is patiently awaited; and, when this has been completed, removal of the sequestrum is duly effected, if necessary. If the whole thickness of bone have perished, an aperture of communication necessarily results between the nasal and buccal cavities. If this be large, the deficiency can be supplied only by a mechanical contrivance. If, however, it resemble a merely fistulous opening, closure of the mucous membrane may be obtained by the occasional application of a heated wire.

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[1] Med. Chir. Transact. vol. xxviii, p. 291. Also Fergusson's Pract. Surgery, p. 531. For Dieffenbach's procedure on this operation, see his operative Chirurgie, 1845, p. 856.

[2] Memoire sur une methode d'appliquer la cauterisation aux divisions anormales de certains organes, et specialement à celles du voile du palais; par M. Jules Cloquet.

[On fissures of the hard and soft palate, see papers by Dr. Mettauer. Am. Journ. Med. Sci. vol. xxi; by Dr. Mütter, Am. Journ. vol. ii, N. S.; Dr. J. M. Warren, ibid. vols. vi, and xv, N. S.; Dr. Pancoast, ibid, vol. vi, N. S.]

CHAPTER XI.

AFFECTIONS OF THE TEETH.

It is unnecessary here to enter fully on the various and important topics connected with the subject of this chapter. A few leading surgical points may be stated; reference being made, on other matters, to the various separate works which treat of Dentistry in detail.

First, it is well that the student remember how affections of the teeth are not connected only with the convenience, comfort, and good looks of a patient—but with his health and very existence. The causes—sometimes remote, sometimes tolerably direct—of many affections implicating the general frame, as well as important parts of it, proceed entirely from the contents of the alveoli. Bad teeth "are frequently the cause—and the sole cause—of violent and continued headache; of glandular swellings in the neck, terminating in, or combined with abscess; of inflammation and enlargement of the tonsils, either chronic or acute: of ulcerations of the tongue or lips, often assuming a malignant action from continued irritation; of painful feelings in the face, tic douloureux, pains in the tongue, jaws, &c.;" of abscess and sinus of the cheek; of enlargement and change of structure in the gum, which may lead to dangerous tumor of the bone; "of disordered stomach, from affection of the nerves, or from imperfect mastication; and of continued constitutional irritation, which may give rise to serious constitutional disease."

Crowded Teeth

Are important in a surgical point of view. Behind, the irritation so caused may induce swelling, vascularity, and ulceration of the mucous membrane; probably with repeated attacks of troublesome and even dangerous cynanche. In front, crowded incisors are very apt to cause abscess; not confined to the soft parts, but implicating the bone also. The remedy is plain; early to prevent mischief, by removal of one or more of the redundant organs; or, at a later period, to retrieve disaster by the same procedure—removal of the cause.

Caries of the Teeth

Is the term employed to denote decay of the osseous matter; which usually commences on the surface, at one or more points, and proceeds inwardly until the pulp is exposed—the enamel also giving way at an early period. When the disease is yet recent and limited, its progress may be arrested; by clearing away the disorganized substance, and "*stopping*" the cavity, either with gold or with cement. But after the pulp has been fairly exposed, and pain established, it may be stated as a general rule—not to be rashly or often deviated from—that under such circumstances "stopping" is not advisable, and extraction of the offending part is highly expedient. Long to retain a decayed tooth, or portion of a tooth, in the hope of by various means quelling the pain of toothache, and so avoiding the pain of extraction, is to court the accession of some of the more important evils already enumerated as likely to spring from such a source of irritation.

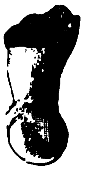
Fig. 91.

Hopeless destruction of the tooth.

Toothache,

It is important to remember, may proceed from different causes; and so requires different treatment in different cases. It may be an example of neuralgia, with or without any connection with diseased teeth or gums; requiring the ordinary anti-neuralgic treatment, local and general (*Principles*, 4th Am. Ed. p. 549). It may be caused by caries of the tooth, advanced so as to expose the pulp; and then may be palliated by anodynes; temporarily arrested, painfully, by escharotics; or entirely quenched by extraction of the tooth; and the last, as already stated, is in most cases the preferable proceeding. It may arise from an inflammatory process in or around the tooth—in the interior of the tooth's cavity, or in the alveolar investing parts—not necessarily connected with decay of the tooth at any part; and this form is plainly to be assuaged by antiphlogistics, local and general; locally, leeches and fomentation to the gum; constitutionally, purgatives, antimony, and low diet: the patient at the same time affording as much rest as possible to the affected part, especially avoiding all irritation of it by tongue, finger, or toothpick. Also, severe pain may be felt in the teeth, apparently sound, quite of a rheumatic origin and character; and this is to be got rid of by anti-rheumatic remedies, mainly constitutional in their operation. Change of structure in the fang of the tooth—it becoming coated by rough osseous deposit—may induce intense pain, though the organ be in other respects sound; by such hypertrophy, it is probable, the nerves are incommoded and compressed; and the only remedy is extraction. And, lastly, the fang, or fangs, of a tooth may become necrosed, the crown and cervix remaining apparently sound; chronic abscess forms around the affected part, the matter accumulating in a distinct membranous pouch; and much pain is likely to be thus occasioned, until either the tooth is extracted, or becomes loose and permits spontaneous evacuation and discharge.

Fig. 92.

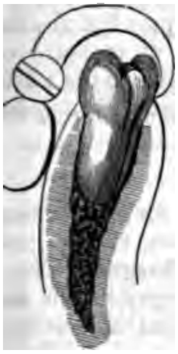


Purulent cyst at the fang of a decayed tooth; often the simple origin of most serious mischief.

Extraction of Teeth.

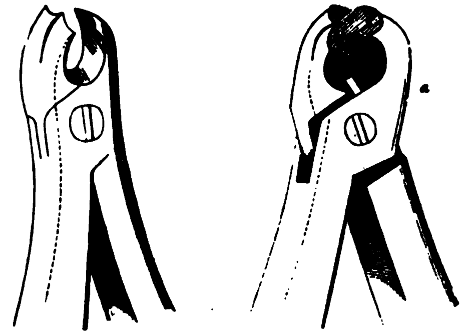
Extraction of a tooth is demanded, not unfrequently, of the surgeon; as an operation of itself; or as a means towards the cure of another, erhaps distant affection—such as neuralgia; or as part of a more s operative procedure—as in extirpation of a portion of the jaw. ps and the tooth-key, are the instruments usually employed. The r, in general estimation, is by much the preferable; equally certain ct the object in view; and possessing the great recommendation

Fig. 93.



showing the applica- of the tooth-key.

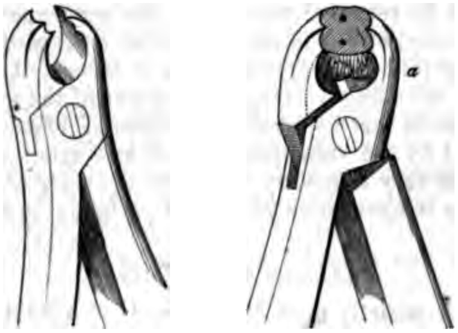
Fig. 94.



Forceps for the upper jaw; constructed so as to adapt themselves closely to the form of the tooth. In *a*, the tooth, sawn across, shown embraced.

erting all the force on the doomed part, and leaving the alveolus gum comparatively, or absolutely uninjured. Practice is, no doubt, tial to the skilful and efficient use of forceps; and many instruments

Fig. 95.



Forceps for the lower jaw. In *a*, the tooth embraced.

equired in the well-equipped armamentarium, adapted to the configu- a and lodgment of the tooth to be removed.

umps are removed either by means of sharp forceps, introduced ith the gum; or by a lever passed between the offending part and veolus, making use of a neighboring sound tooth, if possible, as a um.

Hemorrhage after Extraction.

oublesome bleeding may follow the ordinary extraction of a tooth, nay proceed from one of two causes. An arterial branch, of some and activity, may have been implicated in the injury inflicted on the alveolus. Or the patient may be one of those unfortunates afflicted with the hemorrhagic diathesis. The former case is usually manageable enough. The cavity is sponged dry, and an escharotic applied—nitrate of silver, probably the preferable—so as temporarily to arrest the flow, and afford a dry bed for the compress. Then, with all convenient speed, strips of lint, steeped in a strong tincture of matico, are inserted firmly into the cavity, by means of a stout probe or director; and the jaws, having been brought together with a compress interposed at the injured part, are made to exert and maintain a sufficiency of pressure on the bleeding point. In the other case, the same local treatment is advisable, with the means suitable to the hemorrhagic diathesis (*Principles*, 4th Am. Ed. p. 329).

Tartar on the Teeth.

Accumulation of salivary deposit is to be prevented, for obvious reasons; its presence being prejudicial to the teeth themselves, to the gums, to mucous membrane of the cheek and lips, and to the tongue. The teeth are apt to loosen and decay, the gums to become congested, the mucous membrane to become the seat of obstinate and painful ulceration. In effecting removal, care must be taken to leave the enamel uninjured.

Recession of the Gums.

In advanced years, and sometimes even in middle age, the gums recede from the cervices of the teeth, especially in front, exposing the fangs; occasioning looseness, pain, irritation, and final decadence—though in other respects the organs may be quite entire. In the senile cases, but little can be done by remedial treatment; the occurrence is only a part of the general decay, and is in all respects to be regarded as such. A similar result may follow the accumulation of tartar; it is to be averted by removal of the offending matter. Congestion of the gums may induce it; and this cause is met by local abstraction of blood—by leeches or scarification—and by the subsequent use of astringent dentifrices. At the same time it is very necessary to look to the state of the primæ viæ, and to correct the irregularities which will probably be found there.

Injuries of the Teeth.

A tooth struck smartly may be deprived of a part of its compact structure, without any serious injury to the integrity of the rest. If, however, it have been displaced, and its vascular connection broken up, necrosis is the result. Sometimes simple dislocation occurs, without fracture.

By replacing a dislocated tooth, an imperfect union with the alveolus may take place; but the tooth will eventually lose its color, and induce an unhealthy condition of the gums.

C. Delabarre, Traité de la Seconde Dentition, Paris, 1819. F. Maury, Traité Complète de l'Art du Dentiste, Paris, 1833. Thomas Bell, Anatomy and Physiology of the Teeth, London, 1835. William Robertson, Practical Treatise on the Human Teeth, London, 1839. Chitty Clendon, On Extraction of the Teeth, London, 1844. Goddard and Parker, Anatomy, Physiology, and Pathology of Human Teeth, Philadelphia, 1844. John Tomes, Lectures on Dental Physiology and Surgery, London, 1848. Chapin Harris, M. D., Principles and Practice of Dental Surgery, Philadelphia, 1850.

CHAPTER XII.

AFFECTIONS OF THE JAWS.

Parulis.

THE term Parulis denotes the condition of *Gumboil;* inflammation of the gum, usually connected with a decayed tooth or portion of a tooth. The swelling causes much pain and discomfort, sometimes with smart constitutional disturbance. On suppuration taking place, relief is obtained by evacuation of the matter; but so long as the decayed tooth remains, a certain discharge, with swelling and pain, continues to prove the source of no slight annoyance. Treatment varies according to the stage of advancement. At first, the affection just originating, the decayed tooth should be removed at once, and bleeding from the wound encouraged; and afterwards, if need be, blood may be further withdrawn by leeching the affected part—the animals being most conveniently applied through a glass tube. When matter has formed, it should be early and fully evacuated; and after the excitement following incision has abated, under ordinary antiphlogistic means, the offending tooth or stump should be gently extracted. To perform extraction earlier, might be to aggravate the inflammation unnecessarily.

When the matter has formed and been discharged, extraction of the tooth will ordinarily suffice for effecting contraction and closure of the discharging aperture, with subsidence of the swelling and pain. If not, some of the many suitable astringent solutions may be applied to the part.

Epulis.

Epulis denotes a solid tumor of the gum, of non-inflammatory origin; but, like parulis, often, if not usually, connected with the presence of a decayed tooth, or portion of alveolus. It may be either simple or malignant. The simple form is a sarcomatous growth, at first seated in the soft parts of the gum, but tending soon to involve the subjacent bone; in short, the tumor, at what may be termed its period of maturity, may be truly considered an example of osteosarcoma, on a small scale. It spreads slowly. Teeth loosen, and are surrounded by the fleshy growth; and the body of the bone becomes more and more involved.

In the early condition, it is sufficient to remove the offending tooth, or piece of bone; and, with a bistoury, to excise the altered portion of gum; repressing subsequent tendency to growth, if need be, by the application of an escharotic. When the bone has become involved, it is essential that the affected portion shall be taken away—early, and freely—for obvious reasons; and this is readily effected by knife, saw, and cutting pliers (*Principles*, 4th Am. Ed. p. 424).

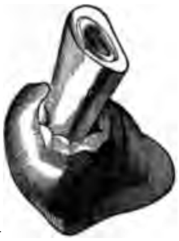
The malignant form is, fortunately, the more rare. Very early the bone is affected; and the tumor is a true specimen of osteocephaloma. Soon the surface ulcerates and fungates, with bloody loathsome discharge, and the spread is rapid in all directions. Obviously, the only remedy is by ablation; and that at a comparatively early period.

Sometimes, malignant disease commences in the upper jaw, not with the formation of tumor, but at once by ulceration—osteocancer (*Principles*, 4th Am. Ed. p. 427). The loss of substance speedily wastes the alveoli, and, opening into the antrum, discloses a foul and hideous sore—soon beyond the reach of the most active surgery.

Tumors of the Lower Jaw.

The lower jaw, like the upper, is liable to be the seat of a chronic collection of fluid—here usually termed Spina ventosa—as well as to be occupied by both osteosarcoma and osteocephaloma.

Fig. 96.



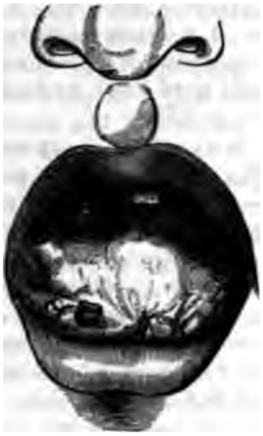
Cyst at the root of a decayed tooth: lined by secreting membrane, and filled with puriform fluid; chronic. Supposed to be the origin, in many cases, of osteocystoma.

Spina ventosa of the lower jaw, is, in truth, an example of *osteocystoma* (*Principles*, 4th Am. Ed. p. 378). The remedy is by puncture and evacuation; gradual contraction and consolidation of the cavity being sought for, by pressure from without, and by maintaining a certain amount of inflammatory process within—as by a seton, or stimulant injections.

The solid tumors require the same treatment as in the upper jaw. But, with this difference, that, in consequence of the relative anatomy of the parts, complete ablation of an osteocephaloma is within our power at a much more advanced period, than in the case of the superior maxilla; inasmuch as the whole diseased structure can be included in the incisions, and taken away.

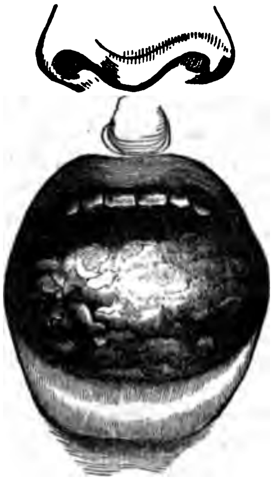
The simple *Osteoma* (*Principles*, 4th Am. Ed. p. 419) has occurred in the lower jaw; at first, to be treated by attempts at arrest of growth, and subsequent discussion; this failing, ablation of the affected part is to be had recourse to, for even this simple structure has been known to degenerate.

Fig. 97.



Osteosarcoma of lower jaw. Hard, smooth, non-ulcerating. Slow in growth.

Fig. 98.

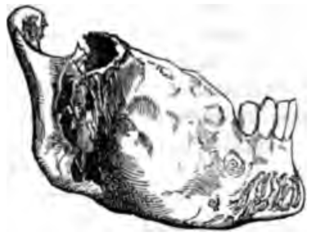


Osteocephaloma: contrasted with the preceding. Soft, fungous, ulcerous, rapidly enlarging, and involving all textures.

Extirpation of the Lower Jaw.

Amputation of the whole bone has been practised, on account of tumor; but with such a result as scarcely to warrant repetition of the operation.[1] The dangers to life are many and almost insuperable. Besides those by loss of blood, and constitutional shock, there is an immediate risk of suffocation by the uncontrolled condition of the tongue and fauces. Inflammatory accession, causing œdema, is, at a more advanced period, certain to cause laryngeal obstruction, threatening asphyxia. And, supposing these dangers past, another remains, by bronchitic or pneumonic seizure, cold air being at once and constantly admitted to the larynx; whereas, for a long time previously, atmospheric entrance had been by a most circuitous and gradual route, in consequence of the presence of the large obstructing tumor. [V. Am. references, p. 201.]

Fig. 99.



Osteosarcoma of the lower jaw, supervening on osteocystoma.—Liston, *Vide* Elements, p. 420.

Partial removal of the lower jaw is a very feasible operation; and, as formerly stated, when undertaken on account of genuine osteosarcoma is seldom followed but by a fortunate issue.

Not unfrequently the jaw is so occupied by tumor, as to render removal of the entire half necessary; by disarticulation, and division at or near the symphysis. An incision is begun over the articulation, and continued downwards and forwards, along the posterior and inferior borders of the bone, first on its ramus and then on the body. Opposite to where it is intended to saw the bone in front, the forward course of the knife is arrested, and the instrument is directed upwards to divide the lip—leaving, however, the prolabial portion entire. The flap, thus indicated, is dissected upwards; including all the soft parts, and fully exposing the tumor. When the anterior portion of the bone, where section is to be made—wide of the tumor—is fully cleared of soft parts, on every aspect; a tooth, if necessary, is extracted; the external surface is notched by Hey's saw, and section is completed by stout cutting pliers. Now the internal attachments of the tumor and implicated bone are divided by the bistoury. And as the articulation is approached, the anterior portion of the bone is depressed by the operator's left hand so as to facilitate disarticulation; yet avoiding such an amount of pressure as may occasion fracture of the altered structure. Depression being made by the surgeon, and an assistant now compressing the common carotid, the muscular attachments to the coronoid process are cut across, and afterwards disarticulation is effected; this part of the operation being completed as rapidly as possible, from before backwards, opening the joint in front, and with the knife's point moving closely to the bone, so as to avoid an unnecessary loss of blood. The bleeding vessels are then tied at the upper angle of the wound, either singly, or by deligation of the common trunk of the temporal and internal maxillary arteries—which may happen to be exposed—by means of an aneurism-needle. The facial, temporarily commanded by the fingers of an assistant, is last secured. And then the flap is replaced, and retained by suture; the entireness of the prolabium in front obviously contributing much to the facility of accurate adjustment. The wound, in its major part, is likely to heal by adhesion; a portion suppurates and gapes, not inopportunely, to permit suitable discharge of the purulent secretion from within. Dressing of the interior is conducted as in the case of the upper jaw; and consolidation, with reparation, in like manner results. During the process of cure, material benefit will sometimes accrue from the use of a mechanical contrivance, adapted to the teeth, whereby overlapping and displacement of the mutilated part is prevented. "Metallic caps are fitted to the teeth of the upper and lower jaws of the sound side, and are riveted and soldered together at their bases, so that, when applied, they shall have the effect of preventing the dragging of the remaining portion of the bone and chin to the opposite side by the external pterygoid, mylohyoid, and digastric muscles, and by the elasticity of the soft parts. This apparatus should be worn for many weeks after the operation."[1] Contrivances may also be temporarily worn, on the injured side, to prevent undue shrinking of the cheek, during granulation.

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[1] The bone, however, has been wholly removed, by plurality of operations, in consequence of recurrence of tumor—successfully.—Lancet, No. 1557, p. 8.

A tumor implicating the body of the bone only, on one side, may be removed by a similar but less extensive incision; section of the bone being made at the angle and symphysis. But the propriety of such a proceeding is very questionable. Experience has shown that, in such cases, return of the disease is very apt to take place in the truncated ramus; and when this happens, difficulty of disarticulation is found to be great, from want of power in depressing the coronoid process, and consequently in dividing the insertion of the temporal muscle. It is xpedient, therefore, in all such cases, to anticipate return of the tumor, nd the difficulties of a second operation, by at once performing disar-iculation. Besides, this is a principle of operation quite analogous to hat determines excision of a long bone, affected by tumor, rather than ts partial removal; preferring, for example, amputation at the shoulder oint to an operation with section of the bone, on account of tumor of he humerus (*Principles*, 4th Am. Ed. p. 423).

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[1] Liston's Practical Surgery, p. 318.

Sometimes, though rarely, osteosarcoma originates in the ramus. hen it is necessary to effect disarticulation, after performing section at r near the angle of the bone. In such a case, it is expedient to grasp he ramus, after section, by means of a firm and sharp-pointed forceps, o that the requisite lever-power may be obtained for depression. Also, t may be possible to effect this operation, without opening the cavity of he mouth.[1]

The symphysis may be removed on account of tumor; a horizontal ound being made along the lower border of the bone, with a perpendi-ular incision at each extremity, leaving the prolabial surface entire. Section of the bone is made partly by the saw, partly by cutting-pliers; the requisite teeth having been previously extracted. After excision as been effected, some care of the tongue is necessary; lest after division of its anterior attachments it should be unduly retracted, and hreaten asphyxia. To obviate this, the organ may be temporarily restrained either by ligature or by forceps.

Sometimes it is necessary to remove the symphysis along with one-half of the jaw; the tumor being so extensive. This is effected by such a form of incision as recommended for disarticulation with section at the symphysis.

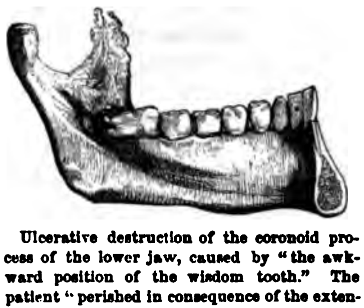
Sometimes it is expedient to remove a portion of the jaw, on account of ulcer or tumor of the soft parts which has implicated the osseous tissue secondarily. One paramount indication must in all cases be fulfilled: to remove the whole of the morbid structure, and to cut wide of the disease.

During these operations on the mouth, it is plain, for reasons formerly assigned, that chloroform, if employed at all, must be used warily.

Caries and Necrosis of the Lower Jaw.

The lower jaw is liable, like other bones, to these common affections. But, in the present day, it suffers much less frequently and extensively in this way, than it did when mercurialization was more in vogue for venereal affections—real and suspected. Many teeth, large portions of the jaw, and even the greater part of the entire bone, not unfrequently were tediously and painfully discharged, as worm-eaten sequestra; causing much disturbance, both local and general, at the time, and great subsequent deformity. When either of these affections do occur, the general principles of surgery are brought to bear on them; by treatment partly local, partly directed to the system.

Fig. 100.



Ulcerative destruction of the coronoid process of the lower jaw, caused by "the awkward position of the wisdom tooth." The patient "perished in consequence of the extensive abscesses of the mouth and neck."—LISTON.

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[1] Syme, London and Edinburgh Medical Journal, 1843, p. 964.

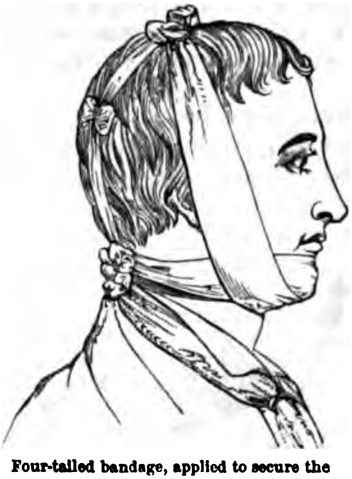
Necrosis of the jaws, from the agency of phosphorous acid, generated in the manufacture of lucifer matches, has been already alluded to (*Principles*, 4th Am. Ed. p. 390).[1]

Fracture of the Lower Jaw.

The lower jaw may be broken by violence applied either directly or indirectly. Fracture near the middle of the body of the bone may be the result either of a blow delivered on the symphysis, or of injury directly sustained by the part fractured. The body of the bone is most frequently injured, but all parts are liable. The ramus has been fissured, the condyle has been broken off, the coronoid process has been snapt through, and the symphysis itself has given way. The fracture may be either simple or compound. Almost always, there is laceration of the mucous membrane, with consequent hemorrhage into the mouth, and exposure of the fractured ends in that direction. The signs of the occurrence are sufficiently plain; by deformity, crepitus, loss of power, and evident displacement. The mental portion is usually displaced downwards, by muscular action.

Reduction is easily effected; and, usually, retention is not difficult. Supposing the fracture to be at its ordinary site, near the middle of the body of the bone, the fragments are carefully adjusted, with the teeth in a line; and two wedges of cork, sloping gently backwards, with their upper and under surfaces grooved for the reception of the upper and lower teeth, are inserted on each side of the mouth; the jaws having been firmly closed on them, a pasteboard splint is adapted to the exterior surface; and the whole is retained by suitable bandaging. The object of the wedges is twofold, and obviously beneficial; namely, to secure accurate apposition of the fragments, and to leave a vacant space in front suitable for the passage of fluid nourishment without movement of the parts. The objection to their use is, that, as foreign bodies, they may cause salivation or other inconvenience: if this should happen, they can readily be removed; and meanwhile, by their temporary presence, considerable benefit may have been obtained. Sometimes, if firm teeth occupy the verge of each fractured portion, it may be well to secure these in apposition by silk ligature. Teeth quite detached should be removed at once; and so ought fragments of bone similarly circumstanced—in cases of comminution. For some time the patient must be content with such articles of food as require no mastication; and all movement of the fractured part must be avoided.

Fig. 101.



Four-tailed bandage, applied to secure the lower jaw.

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[1] *Vide* also Lancet, No. 1367, p. 498.

Dislocation of the Lower Jaw.

Dislocation of the jaw is forwards; the condyles in front of the base f the zygomatic process, and the coronoid processes resting on the edge f the malar bone.[1] The accident may be complete or partial; accord- ig as one or both condyles are displaced. And it may be the result of ere muscular action, as in yawning; or of force applied to the sym- hysis, with the mouth more or less open. The mouth gapes, and can- ot be shut; the chin is depressed, and saliva trickles over it; the condy- id space is vacant, and prominence is felt beneath the zygomatic process; nsiderable pain is experienced, and articulation is very indistinct— erhaps altogether obstructed.

Reduction is effected by a combined movement; depression of the ngle, elevation of the symphysis, backward pressure on the coronoid rocesses, and traction forwards of the whole bone. Thus the bone is xtricated from its entanglement; and brought within the uncontrolled lay of the muscles, is by them pulled back into its normal position. he thumbs, placed over the last grinders, within the mouth, effect the rst movement; the rest of the hand makes the extension, with eleva- on of the symphysis; and an assistant presses back the coronoid pro- sses from their rest on the cheek bone. It is not necessary to protect ie thumbs, by a towel or otherwise. As the jaw is felt to yield, they re made to slide on to the alveoli on the outer side; and the snap, hich accompanies and denotes replacement, finds nothing interposed etween the teeth. For some days afterwards, the motions of the jaw hould be very limited; and in most cases it is well to restrain them by bandage.

Anchylosis of the Jaw.

This may be spurious or real (*Principles*, 4th Am. Ed. p. 471); the esult of change in the soft parts or in the hard. Mastication, degluti- ion, and speech, are seriously interfered with; and the patient anxiously eeks relief. This may be afforded by the knife alone, when cicatrices re in fault; dividing adhesions, and preventing reunion by careful ressing subsequently. Sometimes, in addition, subcutaneous section of he masseter is advisable.[2] When rigidity is extreme, and depends on rue anchylosis, it may be necessary to operate on the jaw itself, in order o prevent death from inanition; sawing the bone through, so as to make false joint; or removing a central portion entirely, for the admission f food.

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[1] Nelaton, Mémoires de la Societé de Chirurgie de Paris, 1849.

[2] Fergusson, Practical Surgery, p. 534.

On removal of the jaw, see Koecker on Diseases of the Jaws, &c., London, 1828. Boyer, lémoire sur l'Amputation de l'os maxillaire inferieur, in Journal Complém. du Dict. des ciences Médicales. Dupuytren, Leçons Orales. Mott, American Medical Recorder, vol. i. usack, Dublin Hospital Reports, vol. iv. [See, also, Am. Med. Recorder, July, 1823; outh's Chelius, Am. Ed. vol. iii; Carnochan, New York Jour. of Med. January and May, 852; Blackman, ibid. February, 1852; Velpeau, Op. Surg. Am. Ed. vol. ii; Mussey, Trans. f Am. Med. Assoc. vol. iii, p. 364; Barton, Am. Jour. Med. Sci. 1831; J. Wood, New York our. of Med. May, 1856; Blackman, Am. Jour. Med. Sci. October, 1856. From these papers will be seen that the American experience of *entire* extirpation is less discouraging than at expressed by the author.]

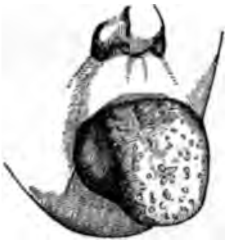
CHAPTER XIII.

AFFECTIONS OF THE TONGUE.

Glossitis.

THE inflammatory process in the tongue may be variously induced; by wounds, stings, or other injuries; by ptyalism; by acrid applications. Or it may occur spontaneously. The symptoms are—pain, swelling, salivation, intense thirst, impairment of the ordinary functions of the organ. In extreme cases, the swelling may occlude the fauces, and threaten asphyxia.

Fig. 102.



Tongue swollen, by glossitis.

The treatment is by abstraction or counteraction of the cause; leeches to the part, or the opening of a ranine vein; and the ordinary antiphlogistics internally. In cases of urgency, we need not hesitate to make longitudinal incisions, freely, as if for phlegmonous erysipelas; the escape of blood is copious, the exuded fluids also find a ready exit, usually the swelling rapidly abates, and the wounds, which at first were gaping and deep, dwindle down to mere scarifications. The antiphlogistic result is satisfactory, and no important lesion of structure is inflicted on the part. Should a case present itself too advanced to admit of waiting for the effects of incision, life must be saved at all hazards—by bronchotomy.

Wounds of the Tongue.

Wounds of the tongue bleed copiously. Hemorrhage is to be commanded by ligature and styptics; if need be, the cautery may be applied. In uniting the wound, after bleeding has ceased, it is plain that we can avail ourselves only of the common interrupted suture—other retentive means being inapplicable to the part. In the slighter cases the use of sutures may effect not only approximation but also a hemostatic result.

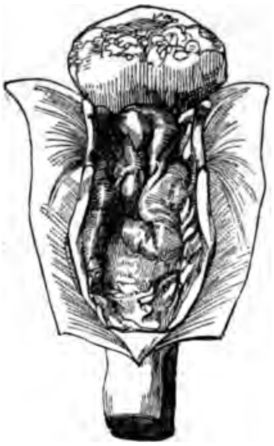
Ulcers of the Tongue.

Ulcers of the tongue, like those of the lips, may be either simple or malignant. The former may depend on local irritation, as from tartar or decayed teeth; or on gastric irritation; or on a general febrile condition; or on a mercurio-syphilitic state of system. And the treatment, it is obvious, will vary accordingly. The preferable local applications are—nitrate of silver, either in substance or in solution; and, in obstinate cases, the fluid pernitrate of mercury; the former applied frequently, the latter at long intervals.

The malignant ulcers are to be got rid of by knife, ligature, or cautery. The two first methods are usually to be preferred; and due care must be ever taken, that the whole of the apparently diseased part, with a border of apparently sound texture, is removed (*Principles*, 4th Am. Ed. p. 287).

Persons of advanced years should be very careful to avoid all continued irritation of the tongue, as by tartar, false teeth, &c., lest troublesome and ultimately malignant ulceration be induced.

Fig. 103.



Excavated malignant ulcer of the root of the tongue. Œdema glottidis has supervened secondarily.

Hypertrophy of the Tongue.

The tongue is occasionally the seat of simple enlargement—congenital, or acquired. The normal texture is gradually expanded; and the papillæ become greatly enlarged. Much inconvenience necessarily results; even though, as usually happens, the jaw in some proportion accommodates itself to the altered interior. Ultimately the tongue protrudes; and a wasting discharge of saliva necessarily results. Deglutition, articulation, and even breathing, are more or less interfered with.

The treatment is by rectification of the primæ viæ—usually very prominently disordered; by repeated leeching of the part; and by internal administration of the iodide of potassium. Bandaging, too, may be applied to the protruded part. And such means, patiently employed, have obtained a cure. But should they fail, it may be expedient to remove a portion of the apex, of a wedge shape, and of such a size as to restore the organ to something like its normal bulk, on approximation of the wound's edges; at least rendering the organ capable of residence within the mouth, so removing the principal deformity and inconvenience—protrusion—and reducing the risk of excessive inflammation in the wound.

Induration of the Tongue.

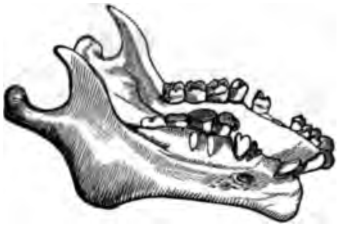
The tongue, instead of undergoing a general hypertrophy, may be affected by partial enlargement; certain portions becoming elevated, hard and painful—being the seat of a chronic inflammatory process of low grade. The swelling may remain of an indolent nature, slowly enlarging or altogether stationary. Or they may slowly suppurate;

the matter imperfectly discharging itself by a ragged and somewhat sinuous aperture; the general appearance of the part closely simulating malignant disease.

The treatment is as for hypertrophy, by leeching, alteratives, and attention to the primæ viæ. In many cases, the internal use of arsenic has been found of signal benefit. And, when sarsaparilla, iodide of potassium, arsenic, fail, a cautious course of mercury may be administered. The combination in Donovan's liquor often proves useful. The unhealthy cavities made by suppuration are to be exposed by potass, freely applied; and then sound cicatrization may be expected.

Erectile Tumor of the Tongue.

Fig. 104.



Expansion of the lower jaw; the result of pressure by the tongue, enlarged by erectile tissue.—Liston. *Vide* his Elements of Surgery, p. 410.

The erectile tumor may form in this organ. A few examples are on record. If the diseased structure be limited and accessible, it is to be removed by inclusion in ligature. If it involve the whole organ, or be otherwise not amenable to deligation, attempts may be made to induce a remedial change of structure, either by ulceration or by plastic exudation (*Principles*, 4th Am. Ed. p. 526). Failing this, the disease must be regarded as beyond the reach of our art. Deligation of both lingual arteries has been practised; but with a result which does not invite repetition; fatal sloughing of the organ ensued.[1]

Removal of Portions of the Tongue.

On account of malignant disease, occult or open, as well as on account of erectile tumor, it may be necessary to remove a part of the tongue. Malignant disease involving the whole organ may be regarded as irremediable.

Carcinoma and Cancer show their ordinary characteristics here, and follow their usual course. A detailed statement of the symptoms and progress of such affections is therefore unnecessary (*Principles*, 4th Am. Ed. p. 283).

Removal may be effected either by knife or by ligature. The former is employed when the doomed part is situate anteriorly, and not extensive; hemorrhage, under such circumstances, being readily under control. By a volsella the part is seized, stretched, and made to project outwardly; and by a bistoury satisfactory ablation is leisurely and carefully effected. Hemorrhage having been arrested, the wound is approximated by suture, if its size and form permit.

In other cases, the ligature is preferred. A stout cord is passed on he proximal aspect of the diseased part, in sound texture, by means of large needle in a fixed handle, as recommended for erectile tumors *Principles*, 4th Am. Ed. p. 524); the noose of the ligature having been ivided, each half is drawn tight separately, so as completely to isolate nd strangulate the diseased portion; and it is well to notch with a knife he line of constriction, previously, so that strangulation may be at nce complete. By whatever mode removal is effected, the prognosis ust be but gloomy; for it can be readily understood, that return of alignant disease is but too probable, in an organ which has been only n part taken away.

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[1] Liston's Elements of Surgery, p. 409.

Sometimes it may be warrantable, even in avowedly hopeless circumstances, to remove a malignant ulcer of the tongue by operation, solely ith the view of palliation[1] (*Principles*, 4th Am. Ed. p. 289).

Division of the Frænum.

In the child, the frænum linguæ may be so short as greatly to incommode the organ; at first impeding suction, afterwards embarrassing rticulation. Or the defect may be more accurately expressed, perhaps, s an abnormal prolongation forwards of the frænum, tying down the pex of the tongue. The faulty texture is readily divided, by means of robe-pointed scissors—the point of the tongue being elevated, so as to tretch the part, by the finger, or by means of a split card; and, cutting ather on the jaw than on the tongue, troublesome bleeding by wound f the ranine vessels is avoided. During healing the part should be anipulated so as to prevent recontraction.

In the adult, a somewhat similar condition may supervene, in consequence of troublesome suppuration beneath the tongue. During cicatrization, the apex of the organ is drawn down, and becomes confined by a dense band of adventitious formation. This spurious frænum may be dissected through; and, by dint of careful dressing, a more favorable cicatrix may be obtained.

Ranula.

Ranula denotes a tumor, formed beneath the tongue, in consequence of obstruction in one or both of the salivary ducts. It consists of a cyst, produced by expansion of the duct, and condensation of the surrounding parts; containing perverted secretion of the cyst, and of the corresponding salivary gland. Not unfrequently, there is good reason to believe that the cyst is not a dilatation of normal structure, but a new formation altogether—like cystic swellings elsewhere. Inconvenience is felt in mastication, deglutition, and articulation; indeed, the term Ranula has been applied on account of the croaking change of voice. The tumor is distinctly seen on elevating the apex of the tongue; and but slight manipulation is necessary to ascertain its cystic and salivary nature.

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[1] See Bennett on Cancerous and Cancroid Growths, p. 129.

Two modes of treatment are applicable: restoration of the normal opening, or the making of an artificial substitute. In recent cases, the former method may succeed. The occluded original orifice is dilated, by probes of suitable dimensions; and the due degree of patency and calibre is subsequently maintained, by the occasional passage of a bougie or probe for some time afterwards. In most cases, however, as in the somewhat analogous circumstances of subcutaneous encysted tumor (*Principles*, 4th Am. Ed. p. 302)—the normal orifice cannot be detected and restored. An artificial opening is made, at an anterior and dependent part. The contents readily escape; but they soon re-accumulate; and the difficulty in the case consists in keeping this artificial opening so patent as to allow of constant discharge, and consequent contraction of the secreting cyst to the capacity and character of the original duct. To effect our object, it is well to touch the aperture occasionally with the potassa fusa, as if to compel cicatrization of the margins without closure. And this object may be further facilitated, by the occasional use of a large probe or bougie, after the caustic has been disused. Failing in our attempts thus, a seton is passed through the cyst, and retained until the requisite contraction is obtained. A piece of silver wire—retained by twisting the ends—may sometimes be found more suitable than the caoutchouc tape, or skein of silk or cotton.

Tumors beneath the Tongue.

Encysted tumors are not unfrequently found in this situation; simulating the condition of ranula very closely. The cyst is thin; the contents are clear and glairy; the size may be considerable. The remedy is by incision and cauterization. The cyst is opened anteriorly by a free puncture; the contents are allowed wholly to escape; and then to the lining membrane is applied either the nitrate of silver firmly, or the potassa fusa lightly; care being taken to confine escharotic action to the part intended. After the use of potass, rinsing of the mouth repeatedly with vinegar and water is a safe and prudent precaution.

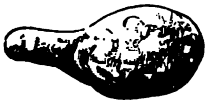
Fatty tumors beneath the tongue have also simulated ranula (*Principles*, 4th Am. Ed. p. 274, Fig. 60). The attachments are delicate and loose; and, for extirpation, little more than mere incision of the investing membrane is sufficient. For obvious reasons, removal by the knife cannot be practised too early.

In the after-treatment of suppurating wounds in this locality, it has already been stated that care must be taken lest, by cicatrization, the condition of tongue-tie become established.

Salivary Concretions.

Concretions form in the extremities of the Whartonian ducts, more frequently than in connection with the parotid gland; with or without obstruction of the saliva's course. Inconvenience is considerable, by the bulk and irritation of the foreign substance. By manipulation and use of the probe, the presence of the concretions can, in most cases, be very readily detected. When of large size, they become fully exposed in the progress of working their own way out by ulceration, after the manner of a sequestrum, or any other foreign substance. The operation for removal is then simple; after suitable incision, the calculus is laid hold of by forceps and extracted. But when the foreign body is small in a large containing cavity, it may retreat, and elude the attempts at seizure. In such a case, let the patient masticate any agreeable article of food; and by the outward current of saliva the concretion will be either washed away, or at least made prominent and superficial.

Fig. 105.



Salivary calculus, of considerable size, removed by operation.

On enlargement of the tongue, see Percy, article *Langue* in Dict. des Sciences Médicales, vol. xvii. Van Doeveren, Dissert. de Macroglossa, Lugd. Batav. 1824. Clanny, Edin. Med. and Surg. Journ. vol. i, p. 317. On affections of the tongue in general, see Brodie, Lancet, No. 1059, p. 346.

CHAPTER XIV.

AFFECTIONS OF THE UVULA AND TONSILS.

Œdema of the Uvula.

Œdema of the uvula, with a relaxed state of the neighboring soft palate, may occur singly; but more frequently it is the result of an imperfectly resolved inflammatory affection of the whole fauces. There is a feeling of very considerable discomfort in the part; the quality of the voice is altered; articulation is impeded; and not unfrequently a tickling and annoying cough exists. The various astringent gargles are of service; with attention to the general system. Failing these, stimulants and astringents may be applied directly to the part, in solution or in powder; as alum, capsicum, tannin, &c. Or the part may be touched occasionally with the nitrate of silver, or sulphate of copper, in substance or solution. In obstinate cases, it is well that scarification precede the last-named remedies.

Elongation of the Uvula.

Relaxation of the uvula, with elongation, is of no unfrequent occurrence; the extremity of the organ passing downwards, and by titillation of the glottis causing a very unpleasant and sometimes distressing cough. Sometimes the extremity is œdematous and bulbous; sometimes it is thin and fimbriated. In the slighter cases, ordinary astringents and stimulants may be tried. But when elongation is considerable, as regards both extent and duration, there is no suitable remedy but by cutting off the redundant part; an operation which has never yet been followed by any untoward consequences. The patient, seated before a good light, is directed to cough, so as to bring the pendulous uvula on the dorsum of the tongue. Then a suitable portion may be at once cut off by the stroke of sharp cutting scissors—probe-pointed, lest the patient should prove unsteady. Or—better—by a volsella, the apex is laid hold of; and then, by stretching the part, section will be facilitated as well as rendered more accurate; care being taken not to stretch until at the instant of cutting, otherwise troublesome retching is apt to ensue. Complete extirpation of the uvula has been recommended in such cases, on the plea that relapse is otherwise probable. But, even supposing the fear to be justly founded, such a ruthless proceeding is scarcely warrantable; the organ being doubtless endowed with some useful function in the general economy.

Tonsillitis or Cynanche Tonsillaris.

term denotes an inflammatory affection of the fauces, chiefly resi-
and around the tonsils; ordinarily the result of atmospheric ex-
; and characterized by swelling, redness, heat, and pain of the
ıpeded and painful deglutition, inability to separate the jaws, diffi-
iculation, marked alteration of the voice, and the ordinary con-
ıal accompaniments according to the intensity and advancement
process. Treatment is by ordinary antiphlogistics, local and
. Scarification of the part is sometimes advisable, with the view
acting blood, controlling swelling, and rendering suppuration less
o supervene. Sometimes large doses of guaiac—half a drachm
powder, thrice daily—have a resolutory and almost specific influ-
Dover's powder, too, is often useful in a similar way. The affec-
y prove formidable by assuming the erysipelatous type, and spread-
rnwards into the air-passages.

Abscess of the Tonsil.

ıcute abscess, of some size, in the tonsil, requires active surgical
rence. If allowed to follow its own course, much distress is likely
ccasioned by pain and swelling, ere evacuation and subsidence
lace; indeed, the swelling may be such as not only to prevent
tion wholly, but also to impede respiration and threaten asphyxia.
des, spontaneous bursting of the abscess may take place during
and a considerable quantity of pus and blood passing suddenly
ıe glottis, unexpectedly, may induce spasmodic dyspnœa of the
ırmidable character, not improbably suffocating the patient. To
uch pains and perils, the general principles of surgery should be
ırried out; by artificially evacuating the pus, as soon as it has
ormed. This may be readily and safely effected thus:—The
, placed before a strong light, is exhorted to great steadiness.
he fore-finger of the left hand the tongue is depressed, and the
opened, so as to expose the red and prominent tonsil—perhaps
occupying the middle of the fauces, and displacing the uvula,
linary occupant of that space. A straight sharp-pointed bistoury,
back resting on the tongue, is passed into the mouth and entered
e centre of the swelling, with the point directed straight back-
as if with the intention of impinging upon the anterior surface
cervical vertebræ; and a puncture having thus been made, a suffi-
perture is then established by moving the instrument with a slight
motion. The pus escapes upon the tongue, and is discharged ex-
y. Lateral movement of the knife, outwards and backwards, is
ılly to be avoided; otherwise important bloodvessels are in danger
internal carotid artery and the internal jugular vein posteriorly,
e common trunk of the temporal and internal maxillary arteries
external aspect.

hronic stage is not unfrequent, in which the tonsil remains swollen,
l, and stationary; affording no sign either of recession, by resolu-
r of advancement by suppuration. Such uncertainty is best dis-

pelled—and usually at once—by the application of a blister over the part, beneath the angle of the jaw.

It is of use to remember, that a patient once affected by tonsillary abscess is extremely liable to return of the affection, on the application of comparatively slight causes, until the first period of adult age has passed; and then the attacks become less frequent and severe, at length altogether disappearing.

Ulcers of the Tonsils.

The tonsils are liable to ulceration from ordinary causes; from exposure to cold or wet, from the irritation of decayed teeth, or from the "cutting" of the last grinders. Treatment is by touching the part occasionally with nitrate of silver, after removal or mitigation of the cause—extraction of the decayed teeth, or scarification of the tense gum.

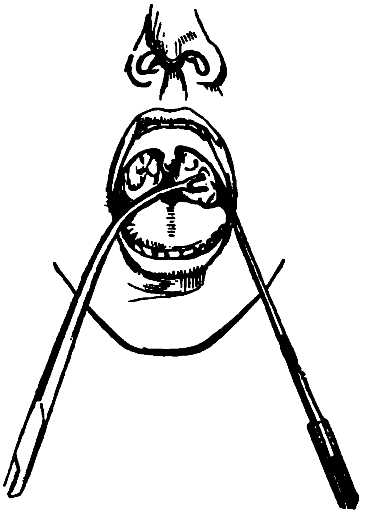
Other ulcers of the tonsils are of constitutional origin; connected with taint of system, venereal, mercurial, or both; sometimes of secondary, sometimes of tertiary accession; the local characters of the sore varying according to circumstances—simple, weak, indolent, irritable, inflamed, sloughing, or phagedænic. Treatment, in such cases, is mainly constitutional.

Hypertrophy of the Tonsils.

In adolescents of weak habit, chronic enlargement of the tonsils is very apt to occur, connected with a minor inflammatory affection of the fauces; the swollen part partially and slowly subsiding between the inflammatory attacks, which are of frequent occurrence and induced by slight causes. In such cases, it is not uncommon for the tonsils to be-become permanently enlarged, by simple hypertrophy. Both are, in general, affected; projecting, as fleshy eminences, into the fauces; interfering considerably with deglutition, somewhat with respiration, and greatly with articulation; often causing deafness, by pressure on the Eustachian tubes; and rendering the patient very liable to acute inflammatory affections of the fauces, on the slightest exposure to atmospheric inclemency or vicissitude.

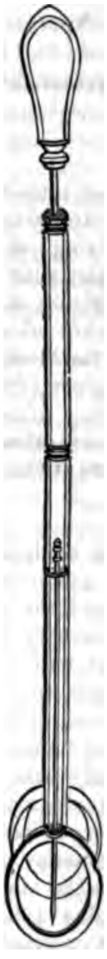
In the state of excitement, mild antiphlogistics are necessary for a few days; low diet, aperients, gentle diaphoretics, sinapisms or other light counter-irritation. In the indolent state, it is our object to amend the general health by a tonic system of general treatment; to obtain gradual subsidence of the swellings by discussion; or, this failing, to remove the redundant texture. As discutients, nitrate of silver, alum, and iodide of zinc, are most in use; the two first rubbed on the parts in substance, the last applied in strong solution, by means of a hair pencil or a piece of sponge. The constitutional treatment is as for the strumous cachexy—a condition very similar to, if not identical with the state of system found to prevail in such patients. When discussion fails, the knife's use is expedient; not to extirpate the glands, but merely to take away the redundant and projecting parts. The mouth being opened before a strong light, the prominence of the swelling is seized firmly by a volsella; and by means of this instrument the part is made tense and ly, and brought more into the central space. A probe-pointed ury is passed into the mouth, with its back resting on the tongue; ts edge having been brought in contact with ower part of the base of the swelling, section rd is effected by a slight sawing motion. A ar procedure is repeated on the opposite side. ling and pain are generally inconsiderable. raw surfaces granulate and heal; occasional cation of the nitrate of silver being made lightly, ed be. It is seldom that reproduction is even tened.

Fig. 106.



Excision of the Tonsils; the knife turned the wrong way.

Fig. 107.



[Fahnestock's Instrument for removal of the Tonsils. Among the instruments especially contrived for this object, this is one of the best; and, for operating upon young or timid persons, it is much more available than the knife or scissors.]

the tonsil-guillotine may be used; an inge- instrument—to be had of the cutler—adapted t once fixing and removing the protruding part. bistoury, however, has this twofold advantage: simple, and always at hand.

jections have been taken to such operations, e ground that dryness of the fauces is apt to r, with imperfect articulation; and that some- also there has seemed to be a certain amount xual impotence induced. The experience of surgeons does not tend to sustain such objec- ; at the same time there is no doubt that most of chronic enlargement of the tonsil, in adoles- , can be got rid of by local discutients and constitutional alteratives, that therefore operative interference should be reserved wholly for cases which have been found to resist milder means.

tirpation of the entire tonsil, by ligature, or by knife—the one operation very hazardous, the other accomplished with great difficulty—is in the present day never contemplated; being well superseded by the partial removal just described.

Malignant Disease of the Tonsils.

Cancerous ulceration may extend to the tonsil from the tongue; or may originate in the gland itself. The latter event is rare.

Carcinomatous or medullary tumor may occupy the tonsil, as a primary disease; but more frequently such enlargement of this part is but an extension of malignant disease from the lip or lymphatic glands.

All such affections are incurable; and operative interference is out of the question—unless, indeed, at an advanced period of the case temporary relief by bronchotomy be deemed advisable, on account of impending asphyxia.

Le Cat, Mémoire sur l'extirpation des amygdales squirrheuses, Journal de Médecine, vol. ii, 1755. Louis sur la resection des amygdales, Mém. de l'Académie de Chir., vol. v, p. 423. Lisfranc, Considerations, &c., sur la Luette, Revue Médicale, July, 1823. Watson, Lectures on Practice of Medicine, vol. i, London, 1843. Allan Burns, Surgical Anatomy of the Head and Neck, Edinburgh, 1811. Harvey on Excision of the Enlarged Tonsil, London, 1850.

CHAPTER XV.

AFFECTIONS OF THE PHARYNX.

Pharyngitis.

THE inflammatory process, affecting the pharynx pre-eminently or olely, is of comparatively rare occurrence. Most frequently it is the esult of a direct exciting cause; as the lodgment of foreign bodies, or e contact of acrid substances. The membrane becomes red and wollen, at first dry, afterwards affording an increased and perverted ecretion; deglutition is difficult and painful; pain is felt on pressure om without; and the ordinary constitutional symptoms attend. The ffection may simply resolve; or ulceration may take place in the memrane, with copious purulent discharge; or the submucous tissue may ecome the seat of abscess; or by submucous deposit of plastic matter, nd change of structure in the membrane itself, contraction of the haryngeal space may result.

Pharyngeal Abscess.

When matter has formed beneath the mucous membrane, a fluctuating et tense swelling may be perceived; and deglutition becomes more and ore impeded, according to the increase of the tumor. In children the ffection is apt to simulate croup.[1] Treatment is by early and free evauation. The ordinary site of abscess is on the posterior aspect of the harynx, in front of the cervical vertebræ and their coverings; and here utting instruments may be used in all security. If the abscess be rge, it is well to use a trocar and canula; lest the pus, suddenly scaping in quantity, might endanger suffocation by passing into the indpipe. If opening be delayed, not only are risk and inconvenience reat by the large size of the tumor; there is also the same danger from udden spontaneous discharge, as in abscess of the tonsil; besides, the ones may be involved by a burrowing of the matter; and, in the ultinate cicatrization of a large cavity, contraction and stricture of the pharynx may result.

Stricture of the Pharynx.

Simple stricture may be the result of simple pharyngitis, causing structural change in the mucous membrane, with accumulation of plastic deposit in the submucous tissue; and on the latter occurrence the contraction mainly depends. Or it may be the consequence of ulceration of the membrane, with or without suppuration of the parts beneath. The prominent and characteristic symptom is difficulty of swallowing, more especially of solid and imperfectly masticated food. And certainty of the existence of the change is determined by the use of a probang or tube, whose passage downwards is resisted by the contracted part. The ordinary site of contraction is at that part of the cavity which is naturally most narrow—the lowest.

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[1] *Vide* Monthly Journal of Medical Science, August, 1846, p. 146. *Ibid.* October, 1847, p. 220. Also Abercrombie, Edin. Med. and Surg. Journal, April, 1819.

Malignant contraction is produced by carcinomatous formati
mucous and submucous tissues; the surface speedily ass
condition, and much unhealthy matter is discharged.
are, great pain in the affected part, increased by motio
expectoration of fœtid, copious, bloody discharge; grea
difficulty in swallowing; gradual wasting of the frame,
tion, partly by progress of the usual malignant cachexy.

The simple stricture is treated by dilatation. A proba
piece of whalebone, with a bulbous extremity made of ivo
is passed gently down to the obstruction; or a gum-elast
be used for the same purpose. One having been selected
as will pass without the use of force, it is lodged in the co
and retained there for some time—according to the sen
patient. After a day or two, the irritation caused by the
ment having subsided, another, a size larger, is simila
And thus, gradually, the normal calibre is restored. An i
full size should be passed occasionally, however, for som
wards, to obviate the tendency to recontraction which
mucous canals so affected. The object of the passing of in
not to excite inflammation or ulceration in the contracted p
would plainly tend to ultimate aggravation of the morbid s
excite absorption of the submucous deposit, and a resolut
with discharge, in the membrane itself. At the same time, s
is also obtained by mechanical dilatation.

The malignant stricture admits only of palliation. Great attention is paid to the administration of nutritive ingesta, so as to husband the failing strength; while pain and discomfort are assuaged by opiates. Direct interference with the part, by means of bougies, or otherwise, with dilatation in view, cannot but do harm. Often, however, the pain of the ulcerated surface may be relieved, by occasionally touching it with a solution of the nitrate of silver.

Spasm of the Pharynx.

In patients of nervous temperament, prone to hysteria, with stomach and bowels disordered, spasm of the muscles of the pharynx is not an unfrequent occurrence; causing pain in the part with an uneasy and apprehensive feeling of tightness, and materially interfering with deglutition. The attacks are only occasional, sudden in accession, and gradual in remission. The treatment is mainly constitutional; of an alterative, tonic, and antispasmodic character. Locally, external counter-irritation of a slight grade, or opiate friction, or a belladonna plaster over the nape of the neck, may be of service. Sometimes even the passing of the probang will not convince the hysterial patient that the affection is merely nervous.

Paralysis of the Pharynx.

This, occurring in the sequel of any disease, is usually of very unfavorable import; denoting affection of the brain, probably by effusion, which is likely to prove fatal. It may occur singly, however; as after external injury of the head or neck; and then the prognosis may be somewhat more hopeful. The prominent symptom is simple dysphagia; without obstruction to instruments, or any other sign of stricture in the passage. Treatment is to be directed mainly to the head and neck, by counter-irritation and such internal remedies as may seem advisable; while life is meanwhile sustained by supplying the stomach with nutritive fluids, by means of a tube passed into the œsophagus.

Sacculated Pharynx.

Sometimes the lower part of the pharynx becomes dilated into a pouch, of greater or less size, situate immediately behind the œsophageal orifice. Food lodges there, sometimes for many hours, coming up again in a kind of rumination. Deglutition is difficult and imperfect; often accompanied, especially when liquids are taken, with a churning noise. Frequently, too, there is a copious secretion of glairy mucus; sometimes accumulating spontaneously in the mouth, more commonly brought up by hawking. The affection plainly admits of no direct treatment; and care must be taken in using the probang—should that be thought necessary for an exact diagnosis—lest it should enter the pouch, and be forcibly impelled thence through the parietes.

Tumors of the Pharynx.

Tumors occasionally, though rarely, form in the pharynx. They are troublesome by the dysphagia which their bulk necessarily occasions, and dangerous by the tendency which all tumors have to enlargement and degeneration. They may be simple, and of the polypous character; and these may be detached by ligature, applied to their base by means of a double canula. Or they are medullary; and then irremediable.

Foreign Bodies in the Pharynx.

Portions of food, and other articles held in the mouth, not unfrequently become arrested in their passage downwards; even though no abnormal contraction exist at any part of the canal. Substances of some size and solidity are likely to rest at the narrowest—the lowest—part of the pharynx. Those of a slim and spiculated character, on the contrary—as needles, pins, fish-bones, pigeon-bones, &c.—are more frequently entangled in the folds of the soft palate. In both situations, the foreign matter is within reach of the finger; and this is the best instrument by which to ascertain the exact site and nature of the lodgment—as well as the best guide to the forceps in extraction. Even a minute substance entangled in the fauces causes much discomfort; and besides, if not removed, will probably induce a certain amount of the inflammatory process. But the larger and solid substances, lodged lower down, call more urgently for our aid; inasmuch as by their bulk and pressure, and by the spasmodic movements which their irritation induces in the larynx, they threaten suffocation.

The patient is seated firmly on a chair; the fore-finger is thrust determinedly into the fauces; and its point is moved about in every direction, until either the foreign substance is discovered, or the surgeon is satisfied that there is no foreign body there. Much retching will be occasioned in all probability; but this must be unheeded by the examiner, and endured by the patient; perquisition of the soft palate being got over as speedily as possible, as the extremities of the nerves concerned in the production of vomiting are chiefly situated there. The presence and site of the foreign body having been ascertained, it is seized by forceps, and gently withdrawn. For pins and small bones in the arches of the velum, the ordinary dressing-forceps, or merely the finger-nail, will suffice. For solid matter lodged lower down, longer forceps, gently curved at the extremity, are more suitable.

It is important to remember that very frequently the painful sensation of a foreign body lodged in the pharynx remains, after the substance itself has passed down into the stomach. When, therefore, we have made a careful examination of the parts, and satisfied ourselves that no foreign body is there, we treat such abnormal sensation by leeching, followed by counter-irritation, or by anodyne embrocation.

The Passing of Instruments by the Pharynx.

The surgeon is not unfrequently called upon to pass instruments into the pharynx and œsophagus; curved forceps for the extraction of foreign bodies; probangs and bougies for the propulsion of impacted articles of food, or for the relief of simple organic stricture; hollow tubes for the conveyance of nourishment into the stomach, in cases of wound of the pharynx or œsophagus—as in cut throat; and the tube of the stomach pump, in cases of poisoning. The points to be attended to are:—to use all gentleness, so as to avoid lesion of the lining membrane of the canal; and to take especial care, particularly when it is our object to throw in ingesta, that the tube does not pass into the air-passage. If the patient be sensible, he is seated on a chair, with the head thrown much back, so as to bring the upper part of the alimentary canal into as straight a line as possible. The mouth having been opened wide, and the tongue depressed with the left fore-finger, the tube is moved rapidly past the soft palate, so as to avoid retching; and its extremity is then gently propelled, resting on the posterior part of the pharynx and made to glide, as it were, on the anterior surfaces of the vertebræ in its passage downwards. When the instrument's point is opposite the rima glottidis, the patient is directed to make an effort to swallow his saliva; or, with the left hand, the surgeon raises the box of the larynx, and at the same ime pulls it gently forwards from the œsophagus; such movement being lainly conclusive to the free passage of the instrument into the latter anal. When insensibility exists, the operation is in one way facilitated; asmuch as there is no resistance on the part of the patient. But, in uch cases, it is plain that our care to insure a right passage for the nstrument must be doubly exerted; the patient having no power to arn us of a threatened deviation from the proper track. In most cases, t is well to assure ourselves fully that the tube is in the œsophagus, and ot in the larynx, before fluids are passed downwards to the stomach. or this purpose, a sheet of paper may be placed over the face, with the xtremity of the tube projecting through it; while in front of the tube lighted taper is put, which by the paper is effectually screened from he flatus of the nostrils in expiration. If, on expiration, the flame emain steady, no air impinging on it, we may proceed with injection; he tube is certainly in its right place. If the flame be extinguished, or ven made to bend considerably, it is equally plain that an error has een made; and that injection would almost certainly occasion fatal sphyxia. It is possible, however, that the flame may be affected a ittle in expiration, although the tube be quite in its right track. For, t is probable that in inspiration a certain amount of air may pass downwards by the tube, which during expiration may be again extruded.

It is well to remember how a large instrument is preferable, in such ases, to one of small size; being much less likely to enter the windpipe. And it is also worthy of note, how, in emergencies, a syringe is not essential to effect clearance of the stomach; a tube having been passed, the uid contents of the stomach may be made to flow out by it, on merely ending the body, and bringing the mouth to a lower level than that of he epigastrium. When a syringe is employed, it should always be with aution; otherwise, ecchymosis and laceration of the gastric mucous embrane are not improbable.

Also, unless previously aware that the stomach contains much fluid, t is prudent to begin the operation by injecting tepid water, which is fterwards pumped out along with the previous contents; and this injecting and ejecting may be repeated, as often as may seem necessary, with he double view of washing out the viscus thoroughly, and at the same ime avoiding injury to the lining membrane.

Watson, Clinical Lecture, Med. Gazette, vol. xvii. Kunze, Commentatio Pathologica de Dysphagia, Lips. 1820. Monro, on the Morbid Anatomy of the Gullet, Edin. 1830. C. Bell, Institutes of Surgery, vol. i. Appia, de Stricturis Œsophagia, Heidelb. 1842. [Gross, Practical Treatise on Foreign Bodies in the Air-passages, Philad. 1854.]

CHAPTER XVI.

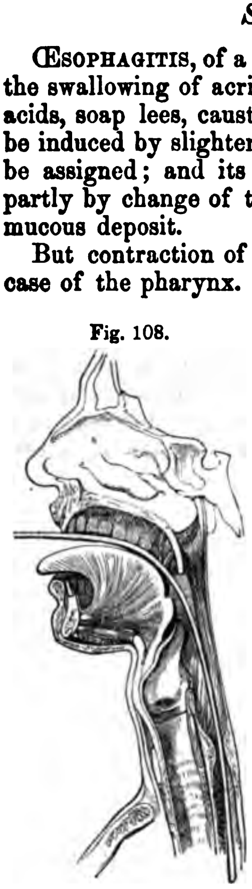
AFFECTIONS OF THE ŒSOPHAGUS.

Strictures of the Œsophagus.

ŒSOPHAGITIS, of a most intense character, is occasionally induced by the swallowing of acrid fluids; as scalding water, the nitric or sulphuric acids, soap lees, caustic alkalies, &c. A more moderate affection may be induced by slighter causes, or may occur when no cause can readily be assigned; and its probable result will be contraction of the canal, partly by change of the mucous membrane, partly and mainly by submucous deposit.

But contraction of the œsophagus may be of three kinds, as in the case of the pharynx. It may depend on spasm; of sudden accession, and only occasional; removable by general treatment. Or it may be the result of a chronic inflammatory process; of gradual approach, constant, and curable only by a cautious use of the simple probang or bougie. Or it may be caused by a structural change of a malignant kind, followed speedily by ulceration, and capable only of palliation.

Fig. 108.



Stricture of the gullet, at its most ordinary site. A bougie shown introduced by the mouth.

The simple organic stricture is of most frequent occurrence. Its ordinary site is at the narrowest part of the canal; opposite the cricoid cartilage. When tight, and of considerable duration, the tube is prone to become dilated above the strictured part, forming a pouch in which food inconveniently accumulates. The constrictors of the pharynx are usually hypertrophied; and the upper cornua of the thyroid cartilage may become closely approximated.[1] Above the stricture, too, ulceration is apt to take place; which, though not malignant, is nevertheless very intractable, and most inconveniently complicates the case. Besides, in consequence of obstruction to deglutition, the system is apt to suffer more or less by an approach to inanition; and therefore, it is obviously our duty to commence the suitable remedial interference at as early a period as possible. In using the bougie, even more gentleness and care, if possible, are expedient,

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[1] Lancet, No. 1209, p. 483.

in the case of strictured pharynx; force being more likely to pro-
lesion of the membrane, and even to cause perforation of the tube.
ıs happened that the head of a probang, supposed to have passed
the stomach after having overcome the stricture, has been found,
death—at no distant date, and not unconnected with the event—
ıve lodged in the mediastinum! Another precaution is equally
ısary; namely to beware that there is no error in our diagnosis; to
rtain that the contraction is really caused by structural change in
æsophagus itself, and not dependent on the pressure of an aneuris-
ɔr other tumor. It is easy to understand how the thrust and pres-
of a probang or tube, acting on the parietes of an advancing aneu-
may fearfully accelerate the fatal issue.

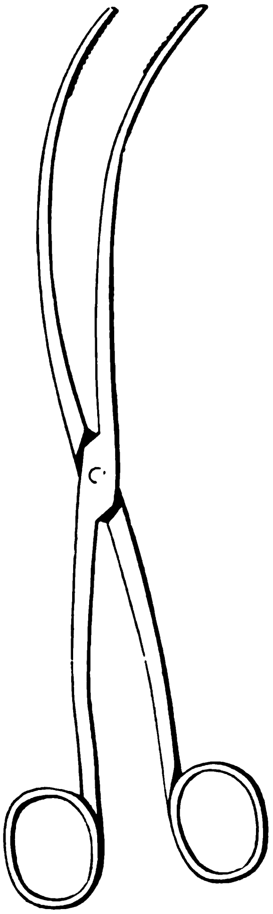
Foreign Bodies in the Œsophagus.

ıreign bodies, whether obtuse and globular, or sharp and angular—
ons of meat, or bones, pins, &c.—become arrested usually at the
ıwest part of the canal, nearly opposite the cricoid cartilage. Or,
ng there in the first instance, they become displaced either upwards
ɔwnwards—usually in the latter direction—by the efforts either of
ıatient or of those whom he calls to his aid. The result varies ac-
ng to cirumstances. There may be simply an irritation produced
ıe presence of a foreign body, with more or less dysphagia; or an
nmatory process is kindled, and advances perhaps to suppuration
ılceration; or by the pressure and irritation of a bulky substance,
ıay be immediately perilled by impending asphyxia. Or, as very
ıently happens, the foreign body slips down into the stomach; leav-
however, a marked sensation of its presence at the site of its tem-
ry arrest.

ıe presence of foreign matter is ascertained by the bent forceps, or
ıe probang; passed carefully down, and moved gently. According
ıe nature of the substance, either extraction or propulsion is prac-
. If the obstructing body be a piece of meat, or other article of
not likely to injure the canal in a forced passage, and capable of
ş subsequently digested in the stomach, it is the simpler practice—
perfectly warrantable—to push the foreign substance gently down-
s by means of a probang. When, however, the circumstances are
ı opposite character—as usually happens; when we are satisfied
the œsophagus cannot fail to sustain lesion in attempts at propul-
and that the stomach will be unable to make any satisfactory im-
ion on the substance, should it be received there, extraction is inva-
y to be preferred. Long, curved forceps are the most generally
able instrument; the surgeon being provided with two pairs, of oppo-
novements in the blades. The one having missed the foreign sub-
e, when this is narrow, or flat, the other can scarcely fail to seize
Seizure having been made, dislodgment from the parietes of the
l is to be effected, by a cautious wriggling movement of the hand,
e extractive power is applied; to avoid unnecessary injury of the
. Needles or pins may be entangled in loops of thread attached
ıe end of a piece of whalebone; passed down to the site of lodg-

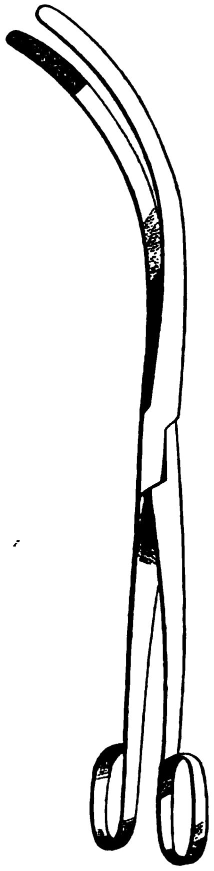
ment, and moved gently about. Flat substances, such as coins, presenting their edges to the operator, may be brought up by a flat and broad blunt hook. When no instrument is at hand, and the case is urgent,

Fig. 109.



Forceps for extracting foreign bodies from the pharynx and œsophagus.

Fig. 110.



The companion forceps to Fig. 109; opening in the opposite direction.

extrusion of the foreign substance may be effected by exciting vomiting; and this may be done either by administration of the ordinary emetics, if swallowing be at all practicable, or by mechanically tickling the fauces.

When indigestible substances have passed into the stomach, they usually find their way to the surface, by the natural outlet—per anum; passing off with the feculent matter—often but little changed—after the lapse of some time. To assist the downward movement, purgatives are often employed. If the foreign body be solid and obtuse, no harm is done, and extrusion will probably be expedited. But if the substance sharp and spiculated, the practice cannot but be mischievous; tend-g to produce entanglement in the mucous membrane, probably with rforation of the bowel; and also tending to kindle inflammation in the fected part. In such cases, therefore, it is more prudent to await the orking of Nature. Needles and pins usually do perforate the intesti-al canal; but, if left to themselves, the process is gradual, accompanied y protective plastic exudation, and consequently harmless. In due me, the foreign body appears at the surface, as if soliciting extraction —perhaps months after the date of its entrance, and after having traversed most circuitous route. Fish-bones, and bones of rabbits or other small nimals, are not unfrequently arrested by the sphincter of the anus, fter having safely made the passage above; and may require the use f both knife and forceps for their removal. Cherry stones, and such ike substances, may lodge in the vermiform process of the caput cæcum, nd excite either abscess there or general peritonitis.

Occasionally, though rarely, it happens that the foreign body will move neither up nor down in the œsophagus. Extrusion and propulsion having both failed, excision is the only other resource. The substance is cut down upon from without, and extracted through the wound.

Œsophagotomy.

The neck is stretched, by elevating and throwing back the head; and, by the fingers of an assistant, the foreign substance is made to project as much as possible on the left side of the trachea. A free incision is made over the swelling, through the skin and platysma myoides; and then by a cautious and more limited use of the knife, the œsophagus is exposed in its most projecting part. Here it is penetrated by the knife; and the opening thus formed is afterwards dilated to a sufficient extent, partly by the finger, partly by slight touches of the knife's edge. The offending matter is laid hold of, by the finger or by forceps, and removed. Hemorrhage having been arrested, the wound is brought accurately into apposition, and treated for adhesion. For some days a tube is worn, passed by the mouth; and through this the necessary nourishment is conveyed, clear of the wound.

It may be imagined that foreign substances may be safely left to loosen themselves by suppuration, and so to facilitate, if not effect, their own extrusion. But experience declares that it is not so. The obstruction to deglutition, and impediment to breathing, are themselves circumstances sufficiently untoward to demand prompt interference. The inflammatory process, too, which is sure to follow, is fraught with both disadvantage and danger; it may lay the foundation of a formidable organic stricture; it may cause a troublesome abscess, resulting perhaps in a fistulous opening in the canal; or, in a low site, ulceration may open into the arch of the aorta, and prove speedily fatal.

Palsy of the Œsophagus.

This, like the corresponding affection of the pharynx, is usually of evil import; betokening disease of the nervous centre. Inability to swallow may be complete; but the probang meets no obstruction.

In some cases benefit may be derived from counter-irritation and use of galvanism; but in most we must be contented with palliation—sustaining life by matters introduced by means of the stomach pump, as well as by nutrient enemata.

Kunze, Commentatio Pathologica de Dysphagia, Lips. 1820. Monro, on the Morbid Anatomy of the Gullet, Edin. 1830. C. Bell, Institutes of Surgery, vol. i.; Arnott, on Œsophagotomy, Med. Chir. Trans. vol. xx. Appia, de Stricturis Œsophagi, Heidelb. 1842. [Mott's Velpeau, Blackman's ed. 1856, vol. iii; Fergusson's Practical Surgery, 4th Am. from 3d London ed. 1853; Watson's paper in Am. Jour. Med. Sci. vol. viii, N. S. Gross, Practical Treatise on Foreign Bodies in the Air-passages, Philad. 1854.]

CHAPTER XVII.

AFFECTIONS OF THE EAR.

Foreign Bodies.

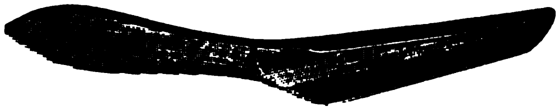
CHILDREN are apt to insert foreign matter into the meatus auditorius, as well as into the nostrils. Dislodgment and extrusion are effected by the same means; by the stream of water injected; or by the use of a flat and bent probe, or curette. Forceps are a still more reprehensible instrument here, than in the case of the nostril; for impaction is not only more probable, but likely to be followed by much more serious results. Abortive attempts to dislodge, by forceps, have occasioned deeper entrance, disruption of the internal ear, intense otitis, and death.[1]

Larvæ have lodged in the ear; causing severe inflammation there, with much local suffering, and grave constitutional disturbance. White precipitate, suspended in milk, when injected, is found successful in killing the animals; and they may be subsequently removed by forceps, curette, or a stream of water.[2]

Polypus of the Ear.

Two forms of Polypi may form on the lining membrane of the meatus externus—usually from that middle part of the meatus which furnishes the cerumen; one soft and pulpy, analogous to the common mucous polypus of the nose; the other more firm and fleshy, resembling rather the solid polypi of the uterus; both simple in structure and tendency. Deafness is occasioned, along with uncomfortable sensations in the part; and more or less discharge escapes, of a puriform and offensive character. Treatment is by evulsion; slim forceps being employed for this purpose, as in the case of nasal polypus. By the use of the ear-speculum, cautiously introduced—an instrument similar to the nasal speculum, only of a more tubular extremity, suited to the cavity which it is intended to explore—the site of growth is ascertained; there the seizure

Fig. 111.



[Gorget Ear-speculum.—After Wilde.]

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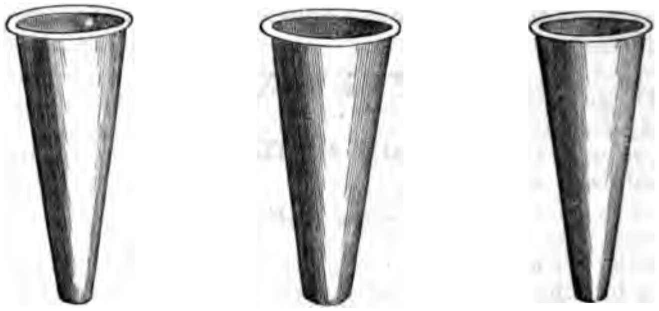
[1] Lancet, No. 1062, p. 458.

[2] *Ibid.* No. 1344, p. 588.

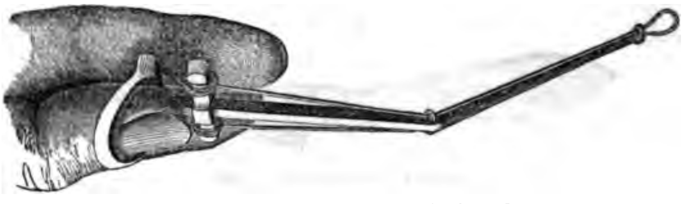
by forceps is made; and, by slight torsion combined with evulsion, extirpation is effected. Or the attachment may be divided by means of blunt-pointed scissors. When the growth springs from near the membrana tympani, however, evulsion is not safe; and it is better to destroy it by caustic—such as the potassa cum calce.[1] [In examining the external aperture of the meatus, the little gorget-like instrument (Fig. 111), recommended by Wilde, will be found useful. For more thorough examination of the meatus and of the membrana tympani, the conical tubes here represented, are the best. The instrument preferred by Wilde for the removal of aural polypus from any portion of the meatus, is the small snare-like apparatus here represented, consisting of a fine steel stem, five inches long, and bent in the centre, so as to allow of its convenient employment by the operator without obstruction to his view; with a movable bar sliding on the square portion near the handle, which latter part fits over the thumb, as shown in the cut. The upper extremity is perforated with holes running parallel with the stem; and loops at the angle serve the same purpose. A fine wire, fastened to the cross-bar, passes through these loops and holes; it should be of such a length that, when the crossbar is drawn up tight to the handle, the ligature is fully on the stretch. The best kind of wire is the No. 24 fine steel wire, annealed. For a further account of this admirable instrument see Wilde's Aural Surgery, p. 398, from which the foregoing description and illustrations are taken.]

Fig. 112. Fig. 113. Fig. 114.



[A more simple and efficient Speculum for the Ear, recommended by Mr. Wilde, of Dublin. It is made of silver, highly polished on the inside; various sizes should be made, for ears of different dimensions. (From Wilde.)]

Fig. 115.



[Wilde's snare for removal of aural polypus.]

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[1] Toynbee, Medical Times and Gazette, Jan. 3, 1852.

When bleeding has ceased and pain subsided—after the use of forceps or scissors—it is well to touch the part with nitrate of silver, so as to diminish the chance of reproduction. And if the morbid structure should not have been entirely removed, such cauterization may require repetition from time to time. During the healing process, relaxation of the membrane, with copious discharge, is apt to prove troublesome; demanding the daily and repeated use of gently-stimulating and astringent injections.

Fungoid granulations, of a polypous character, not unfrequently spring from the membrane of the meatus, in cases of long-continued otorrhœa. They grow from the lower part of the tube, or from the membrana tympani itself; and when of large size may simulate polypus. They are got rid of by nitrate of silver, used escharotically, and by the subsequent employment of astringent injections.

Otitis.

The inflammatory process may attack the mucous membrane of the ear, and textures connected therewith, either on the exterior or on the internal aspect of the membrana tympani. In the one case the affection is said to be external; in the other, internal.

External Otitis.—This most frequently occurs in the young; the result of exposure to cold, with or without irritation caused by affections of the teeth or gums. It constitutes the common earache, from cold; the pain being that which attends on the ordinary inflammatory process, occurring in a part of extreme sensitiveness. The affection may simply resolve; or it may cause a puriform exhalation from the membrane; or abscess may form beneath the membrane, pointing, discharging, and causing much aggravation of distress. Treatment is simply antiphlogistic; leeching behind the ear, fomentation, hot poultices, purges, and antimony. When abscess forms, activity in the application of heat and moisture is redoubled; and as soon as the appearance of matter is presented, evacuation is effected by puncture.

Internal Otitis is a more serious affection; and may be variously induced: by injury, exposure to cold, or extension of a more outward attack. Pain may not be more acute, but it is deeper seated and more intolerable; attended with throbbing, and confusion of the head; the system sympathizing in well-marked inflammatory fever. If the process advance to suppuration, disruption of the internal ear, with loss of hearing, is all but inevitable; and very probably a still more serious result may ensue, namely, affection of the interior of the cranium. Treatment is actively antiphlogistic. When certain that acute internal otitis exists, we will not content ourselves with leeching behind the ear; but may take blood both from the part and from the system. Calomel and opium, too, will be administered; the invasion of an organ of delicate texture, of important function, and in near connection with the brain, being sufficient warrant for such procedure (*Principles*, 4th Am. Ed. p. 149). In short, the best efforts will be made early and satisfactorily to subdue the rising process, so as to prevent suppuration if possible. When matter has formed in the cavity of the tympanum, the membrana tympani acts injuriously by repressing outward discharge of the abscess; occasioning tension, with aggravation of the symptoms. Here the general rules of Surgery are to be fulfilled; by incising the tense, resisting membrane—which is seen white and prominent—so soon as we are satisfied, by its change of color and form, and the course of the general symptoms, that intra-tympanal suppuration has taken place. The membrane must yield ultimately, by ulceration or sloughing; probably too late to save the delicate and complicated apparatus of hearing from irreparable injury; perhaps too late to prevent extension of aggravated inflammatory disease to the brain or its membranes.

Chronic Internal Otitis is common; less formidable than the acute form at the time of invasion, but prone, if unchecked, to lead to equally serious consequences. The membrane may be simply changed in structure; thick, rough, and vascular; clogging and enveloping the ossicula auditus. Or suppuration may take place, with perforation of the membrana, and probably with ultimate necrosis and discharge of the ossicula. Treatment consists in attention to the general health, alteratives, and patient counter-irritation.

Otorrhœa.

By this term is understood a puriform or purulent discharge from the ear; the result of chronic inflammatory disease. Usually it is preceded by the ordinary signs of an attack of otitis, acute, or subacute in character. Children are most liable to this affection; and especially those of strumous habit. Often it is one of the sequelæ of scarlatina. It is well to examine the meatus attentively, by means of the speculum, discharge having been previously removed by gentle ablution. For if the membrana tympani be found entire, and tolerably sound, the affection is so declared to be comparatively simple; whereas, if that membrane be found imperfect, denoting an internal origin of the suppuration, prognosis is rendered more guarded and unfavorable.

It must never be forgotten that the term Otorrhœa, in truth, comprehends many affections; inflammation of the external ear, of the cavity of the tympanum, or of the mastoid cells. And it is equally important to observe that inflammation, begun in the external meatus, may at any time extend to the other parts, and thence to the contents of the cranium; from the tympanum to the cerebrum, and from the mastoid cells to the cerebellum.[1]

Treatment is mainly palliative and expectant, as regards the part; restorative as regards the system. The constitutional cachexy is to be combated by the usual means. The ear is kept clean by frequent and careful use of tepid water, without and within the meatus. The state of the mouth is looked to; and, if need be, amended. Reaccessions of inflammatory disease are averted or subdued, by occasional leeching and fomentation, as circumstances may require. The chronic affection, which is maintaining the structural and functional disorder of the mucous membrane, is sought to be overcome by careful counter-irritation—such as blistering behind the ear; this, however, being proceeded with cauiously, lest enlargement of the glands of the neck, which frequently is an accompaniment of otorrhœa, should be either induced or aggravated. When nearly all the symptoms of inflammatory disease in the part have ubsided, and when the general system has decidedly improved, weak astringents may be employed, to favor recovery of the membrane, and consequent cessation of the discharge. This part of the treatment, however, must always be conducted with the greatest possible care; lest, by sudden arrest of the discharge, return of the inflammatory attack, in a deeper site, and in an aggravated form, should unhappily ensue. Such isk is in all cases great, when sudden arrest of discharge has occurred, from any cause; but especially in those cases in which implication of he internal ear is indicated, by imperfection of the membrana tympani, and perhaps previous discharge of the ossicula auditus.[1]

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[1] "No person suffering from chronic catarrhal inflammation of the dermoid layer of the meatus, the membrani tympani, or of the mucous membrane of the tympanum, can be assured that disease is not being prolonged to the temporal bone, the brain, and its membranes; and that any ordinary exciting cause, as an attack of fever or influenza, a blow on the head, &c., may not induce the appearance of acute symptoms, which, as a general rule, are speedily fatal."—Toynbee, Med. Chir. Trans. vol. xxxiv.

Otorrhœa in the adult may be connected with the lodgment of foreign matter in the meatus, long overlooked. A grass-seed, or such like subtance, may be extruded after many years; otorrhœa—occasional or constant—having been maintained during the whole period of its residence.

Otorrhœa is occasionally connected with a degenerated condition of he pars petrosa of the temporal bone; which has softened, and become converted into a medullary mass. The symptoms are cerebral and obscure. The issue is hopeless. And it is very plain that the fatal event would certainly be much accelerated by a successful attempt to arrest the aural discharge.

Abscess of the Mastoid Cells.

The inflammatory process may originate in the cancellated texture of that part of the temporal bone which constitutes the mastoid process. It may be the result of external injury; more frequently it occurs without any appreciable exciting cause, in systems of the strumous character; and is most especially liable to invade those, whose original cachexy of system has been aggravated by imprudent exhibition of mercurials. Like the preceding affection, it is most frequent in the young. But very often this disease is but the extension of an originally mere outward affection; namely, long-continued inflammation of the external meatus. If suppuration be attained to—as is extremely probable—caries may hardly fail to be established; and is usually complicated with necrosis, portions of the osseous texture separating in the form of sequestra. From the near connection of the posterior surface of the cells with the dura mater of the cerebellar cavity, it can easily be understood how readily, in advanced cases, the latter texture may be involved. The lateral sinus, too, is in close contact; and perforation of this vessel gives rise to two formidable dangers, hemorrhage and pyæmia.

Supposing the affection to be primary, treatment in the first instance will be directed to averting suppuration and caries, if possible, by the ordinary means. When there is reason to believe that matter has formed, we shall be very anxious to obtain an early and sufficient opening externally, and thus to limit the mischief already done. Otherwise, there is great danger by extension. The internal ear having been involved, hopeless deafness will ensue; paralysis of that side of the face is not unlikely, from implication of the portio dura; nay, it is possible that the contents of the calvarium may be attacked, as already stated, directly and imminently perilling existence. But, independently of such aggravations, life may be hazarded by the hectic of a continued and wasting discharge.

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[1] An analogous affection occurs in connection with the nose. Purulent discharge has taken place for some time from the nostril; suddenly it ceases; death ensues, with head ymptoms; and on dissection, caries of the cribriform plate of the ethmoid bone is found, with corresponding affection of the brain.

From local treatment alone, but little good need be expected; constitutional means must be at the same time, and sedulously, employed. When employing counter-irritation, the blister should not be placed over the part affected—otherwise the disease might be increased—but at a distance, as on the nucha, or between the shoulders.

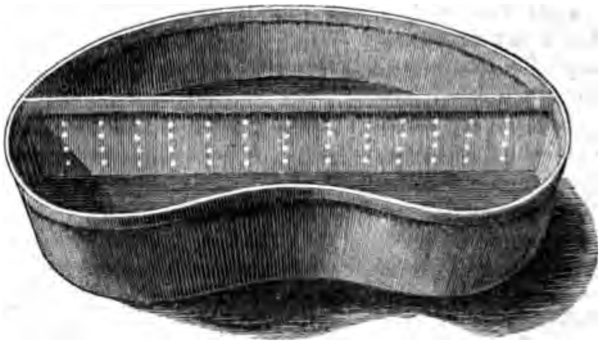
Otalgia.

This constitutes true earache; a neuralgic affection, unconnected, directly, with the inflammatory process. Very frequently it is connected with irritation of the mouth. The pain is very distressing, and has all the characters of neuralgia. It is amenable to the same treatment (*Principles*, 4th Am. Ed. p. 549), search for a dental cause or connection never being neglected. Among the anodynes suitable for application to the part, aconite and belladonna deserve a prominent place.

Deafness.

Deafness may proceed from the affections already mentioned, and from many causes beside. In order to arrive at a true diagnosis, careful examination of the external meatus, and of the membrana tympani, is essential; and to effect this, the well-made speculum is of great service.

Fig. 116.



[Wilde's metallic ear-syringe basin, six inches long, four broad, and two deep, with a perforated septum to serve as a strainer. Concave side is applied closely under the ear, and receives the washings. Syringe draws its supply from the other side.—After Wilde.]

Deafness is very frequently occasioned by *Accumulation of inspissated Cerumen* within the meatus. Or, perhaps, obstruction to the vibraions of sound is rendered still more effectual, by commixture of wool or otton with the cerumen; the patient having been in the habit of negli-eently stopping his ears, besides forgetting to practise requisite cleanli-ess. The presence of obstruction will be at once declared by use of ie speculum; and often that is not necessary; tension and straighten-ig of the tube, by pulling the lobe, before a clear light, being sufficient. Remedy consists in removing the offending mass. And this is best

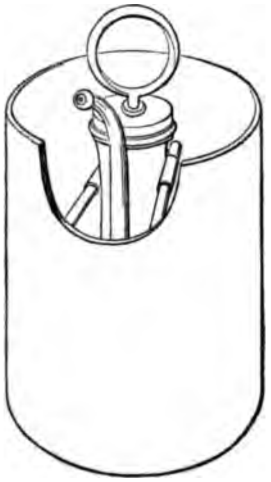
Fig. 117.

[Metallic ear-syringe, holding three or four fluidounces.—From Wilde.]

ffected by washing out the meatus with hot water, by means of a stout yringe. [This may be best employed with Wilde's basin (Fig. 116), 'hich fits closely to the cheek.] Instruments such as employed for onorrhœa, or for the injection of sinuses, are wholly inefficient; the yringe should be of metal, well valved, and of considerable power. A metallic cup syringe of Hullihen's pattern Fig. 118), holding at least three fluidounces, nd fitted with a longitudinal perforated sep-im, and a concave side, would answer every urpose.] And the injection is persevered i, either at one or at repeated sittings, until ie membrana tympani is disclosed clear, on ie use of the speculum. When the cerumen i unusually hard and tenacious, it may be osened, previously to syringing, by the care-il use of a curette, or by moistening it with and oil for a day or two.

Deficiency of ceruminous secretion is an oc-isional, but much less frequent cause of deaf-ss. The meatus is found dry and empty, id the membrana tympani is seen clear and istening. Stimulants are of use in restoring e secretion—as the essential oils, more or ss diluted; and their action may be further sisted by stimulant friction around the auri-e. Exhaustion of the cavity is said also to ve a beneficial effect; by means of a syringe, ted with a soft nozzle which completely oc-udes the meatus. Until the normal secre-on returns, glycerine applied by means of a hair pencil will be found valuable substitute.[1]

Fig. 118.



[Hullihen's self-injecting ear-syringe. An ingenious and convenient arrangement of basin and syringe together.—From Hewson, in Am. Ed. of Wilde's Aur. Surg.]

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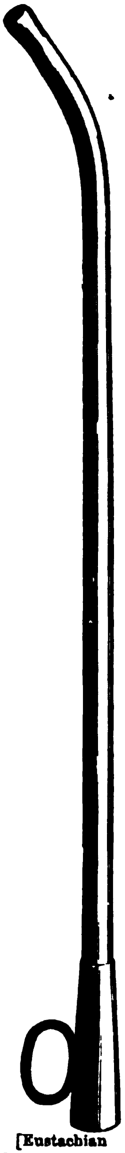
[1] Wakley, Lancet, No. 1346, p. 631.

Thickening of the lining membrane of the meatus is a cause of deafness; the result of chronic inflammatory disease. It is to be treated by the application of gentle stimuli—such as solutions of nitrate of silver, sulphate of zinc, &c.,—which are best administered by means of a hair pencil. Rectification of the general health, and counter-irritation behind the ear, are often useful auxiliaries.

Fig. 119.



[Eustachian Catheter.—From Wilde.]

The membrana tympani may be changed in structure; thickened and congested; the result of inflammatory disease. Similar treatment is advisable; the stimulants being applied by means of injection; except when the membrane is imperfect, and then again the hair pencil becomes preferable, lest undue excitement be caused in the internal ear. Imperfection of the membrane, by ulceration, or by rupture in consequence of external injury, may be repaired by Nature's effort. If not, hearing may be much quickened by applying a small shred of lint, or cotton wool moistened in glycerine, over the aperture.[1] Or an artificial membrana may be adjusted and worn, as recommended by Mr. Toynbee.

By *hypertrophy of bone*, the osseous meatus may be so contracted and changed, as to produce a considerable amount of deafness; an affection obviously but little amenable to treatment.

The internal ear may be disordered; and on this cause the great majority of cases of deafness are found to depend.[2] The change may be in the lining membrane, in the osseous texture, or in the nerves. Fortunately, modern research has declared the most usual site of disorder to be the texture first named—the one most amenable to successful treatment. This mainly consists in attention to the general health, and patient perseverance in the use of counter-irritation—the latter preceded by moderate local depletion.

The extremity of the Eustachian tube may be obstructed, in various ways, and deafness ensue. It may be shut up and compressed by enlarged tonsils, or by nasal polypus hanging low from the posterior nares. In such cases, deafness will disappear on removal of the tonsil or polypus.

Congestive swelling and relaxation of the fauces may cause obstruction of the tube; to be removed by astringent applications, counter-irritation, and attention to the general health.[3]

Ulceration of the fauces, implicating the extremity of the Eustachian tube, may cause more serious obstruction by the contraction which occurs on cicatrization. This is to be obviated by speedily healing the ulcer, while yet superficial and

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[1] Lancet, No. 1296, p. 10; and No. 1298, p. 64.

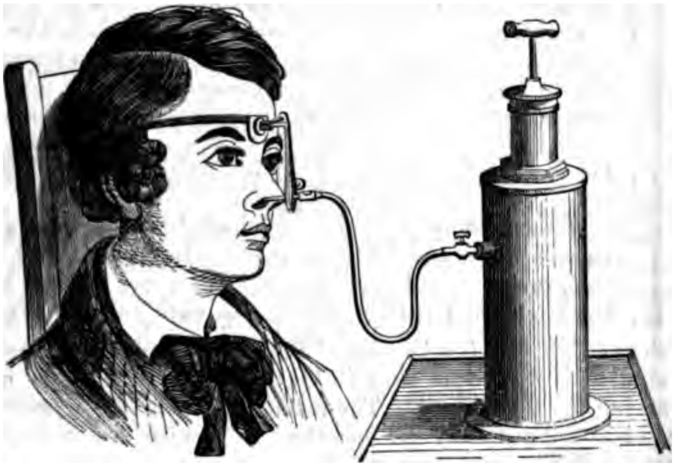
[2] Toynbee, Med. Chir. Transact. vol. xxiv.

[3] Clearness of the tube is ascertained by directing the patient to shut his mouth and nostrils, and then to expire forcibly, as if blowing his nose. He will be sensible of click in the ear, produced by the shock of air acting on the membrana tympani—supposing this to be entire; and the sound will be very plainly heard by the surgeon, through a stethoscope

slight extent; and is to be remedied—if possible—by the introduction
probes, or catgut bougies, whereby to effect gradual dilatation of the
ıal. The probe, or bougie, about six inches long, and sufficiently
:ved, is introduced along the floor of the nostril, with the convexity
wards; and, just before the pharynx is reached, it is gently turned
as to bring the point outwards and a little upwards—the mouth of
Eustachian tube being above the level of the floor of the nostrils.
the tube is open, the instrument will be plainly felt entering it. When
struction or obliteration exists, pressure is to be made where the
rmal aperture ought to be; in the hope that thus the obstruction may
overcome. Sometimes the operation is at least partially successful.
.t in too many cases, this as well as the other operations on the Eusta-
ian tube, are found to be not only difficult in performance, but also
gatory in their result.

By catheterism, as it is termed, it is proposed to rid the tube of a
lundancy of mucus;—another cause of deafness; but that will pro-
bly be as easily and certainly more safely accomplished, in most cases,
general treatment, gargles, and counter-irritation. In chronic affec-
ns of the membrane of the middle ear, it is possible that benefit may
netimes follow the careful injection of water, air, or medicated vapor,
o that cavity; and this is accomplished by means of the metallic
stachian catheter—introduced in the same way as the probe, and
ed with a suitable syringe. All such operations, however, must be
ıducted with the greatest caution; seeing that it requires but little
rbid change in the bony walls of the tympanum to produce an
ıost direct communication between that cavity and the interior of the
nium.[1]

Fig. 120.



[Apparatus for injecting Eustachian tube, as applied.—From Wilde.]

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ed on the mastoid process. If the tube be open, but clogged with mucus, the noise is
gurgling or crackling kind.

Toynbee, Medico-Chir. Transact. vol. xxxiv, 1851. [See also Wilde, Aur. Surg. pp.
o 84, for the most useful advice and detailed instructions in regard to this operation.]

Organic change in the brain, or in the auditory nerve, is not an unfrequent cause of deafness; and seldom admits of successful treatment. Hopes of amendment will mainly rest on counter-irritation, and on mercurialism moderately employed.

Functional disorder of the nerve is fortunately a more frequent, as well as more hopeful cause; variously induced—as by blows, falls, loud noises, disorder of the general health, &c. Besides obviating the inducing cause, employing counter-irritation, and perhaps venturing on mercurialism, benefit may be obtained from the endermic use of strychnine—as in the analogous case of functional amaurosis. Or a few drops of an alcoholic solution of strychine may be dropped into the ear, from time to time.

Determination of blood to the head, in consequence of suppression of normal or habitual discharge, or however induced, is not unlikely to produce a certain degree of deafness, along with noises and other unpleasant sensations in the head. Treatment is by leeching or cupping, purging, and other means ordinarily found available to overcome local plethora.

Perforation of the Membrana Tympani.

This little operation is not frequently required. It is deemed advisable when, by insuperable obstruction of the Eustachian tube, access of atmospheric air is denied to the cavity of the tympanum; and also when that cavity has become obstructed by extravasation of blood. The expediency of simple puncture, in the case of abscess of the tympanum, has been already noticed.

In cases of deafness, caused by obstruction of the Eustachian tube, it is our object not merely to make an aperture in the membrane, but to keep that pervious; and so permanently to atone for want of the accustomed atmospheric supply in the middle ear. This may be accomplished by using the instrument of Fabricci. "It consists of a canula, into which slides a spiral wire, somewhat resembling that of a cork-screw. It is to be used in the following manner:—Pass the canula with the spiral wire down upon the inferior part of the membrana tympani (so as not to interfere with the manubrium of the malleus), retain it there with the left hand, being careful not to press too firmly on the membrane; then, with the right hand, take hold of the small handle which revolves the spiral wire, and turn it from right to left, being what is usually called turning the *wrong way.* The instant at which the membrane is perforated is sensibly felt by the operator. The wire is now no longer to be turned; but by its handle the instrument is to be retained in its situation; then gently revolve the canula, which has a cutting edge, from left to right, when a circular portion of the membrana tympani, corresponding to the diameter of the canula, will be cut out, and at the same time drawn into the canula and held fast by the spiral wire."[1] Or, instead of this instrument, a trocar, volute and sharp in the sides, may be employed; turning it quickly in the membrane, so as to excise the punctured portion.

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[1] Williams on the Ear, p. 204.

Hemorrhage from the Ear.

Blood, escaping by the ear, may proceed from various sources, and requires different treatment accordingly. 1. One of the most prominent symptoms of fracture at the base of the cranium is bleeding from the ear; amenable to no direct treatment; and usually an unfavorable omen. 2. Mere laceration of the lining membrane of the meatus may furnish a copious discharge of blood; independent of any injury done to the cranium, or elsewhere. It, too, requires no direct treatment—not being ikely to prove excessive. And it is not a sign of an untoward character. It may be the result of a blow, fall, or direct injury done to the part. 3. Passive hemorrhage may take place from this, as from mucous surfaces; amenable to the ordinary treatment, local and constitutional, suitable in such cases. 4. The internal carotid may have been opened nto by ulceration. The hemorrhage is constant, copious, and of the arterial character. Pressure may be tried, with styptics, but may fail. The only sure remedy is ligature of the common carotid artery. 5. The ateral sinus, opened by ulceration, may be the source of bleeding—dark and venous. In this case, while ligature of the carotid would prove wholly nugatory, moderate pressure is found to be quite effectual.

Hypertrophy of the Auricle.

Hypertrophy of the whole auricle is an occasional, though rare, occurrence. Partial hypertrophy—affecting the lobe only—is more frequently met with; and chiefly in women. If excessive and irksome to the patient from its unseemliness, the redundancy may be removed by the knife.

This deformity, however, may be artificially and intentionally produced; as by those native Indians who wear a dagger suspended from he lobe of the ear.

Otoplastics.

Deficiencies of the auricle—by wound, ulceration, or sloughing—may be repaired by autoplasty. Restoration of the entire organ is scarcely o be attempted; but a portion may be readily replaced—when laxity of the surrounding integument is favorable—by an operation conducted on the same principle as rhinoplasty.

Congenital Occlusion of the Meatus.

The meatus may be congenitally imperforate. It may be fully deeloped in all respects, but covered by integument. In such a case, imple incision of the skin, and careful dressing of the wound, so as to revent contraction, will suffice to establish the normal state.

Or a thick fleshy covering may conceal the cartilaginous tube, which s only partially developed. And in this case a more careful and regular issection may obtain a similar result, but perhaps more imperfectly.

Or the external apparatus of hearing may be altogether deficient; the bone itself being imperforate. Such cases are wholly beyond the reach of our art: yet it does not follow that hearing is denied, or even very imperfect. A boy, aged fourteen, came from a distance, desirous of having an aperture made in each auricle; and each of these organs was found very imperfectly developed, of a shrivelled appearance, and wholly imperforate. On making a very careful dissection down to the bone, in search of an external meatus, it became apparent not only that no such tube existed, however imperfect, but that also there was no aperture in the temporal bone. Yet the patient heard ordinary conversation, if distinct and rather loud; he had gone to school at the same age as other boys, and had made equal proficiency in the ordinary branches of education, although no unusual means of teaching had ever been applied to him; and he assisted his father in the occupation of a butcher, with much smartness and intelligence. A series of experiments, conducted by my colleagues, Professors Forbes and Thomson, seemed to show that he heard mainly by conduction of sound through the bones of the cranium to internal ears very perfectly constructed.[1]

[1] Monthly Journal, Dec. 1846, pp. 420 and 729.

Itard, Traité des Maladies de l'Oreille, Paris, 1821. Abercrombie on Diseases of the Brain, &c, Edin. 1828. Bright, Hospital Reports, vol. ii, part i, London, 1831. Kramer, on Diseases of the Ear, Berlin, 1836, translated by Bennett. Pilcher, on the Structure and Diseases of the Ear, London, 1838. Williams, on the Ear, London, 1840. Wilde, on Otorrhœa, Dublin Journal of Med. Science, Jan. 1844. Warden, Edin. Phil. Jour. Oct. 1844. Yearsley, Lancet, 1848, vol. ii, pp. 10, 64, &c. And Mr. Toynbee's various papers —Medico-Chir. Transactions, vols. xxiv, and xxxiv—Med. Gazette, July, 1843—Monthly Journal, Feb. 1849 [The latest and by far the best work on Diseases of the Ear is Wilde's Aural Surgery, Am. Ed. by A. Hewson, Philadelphia, 1853.]

CHAPTER XVIII.

AFFECTIONS OF THE NECK.

Glandular Enlargement and Abscess.

In scrofulous adolescents, the glands of the neck are very liable to enlargement, by a chronic inflammatory process; and frequently, notwithstanding every effort to the contrary, suppuration is reached to—causing more or less deformity by unseemly cicatrization. In the nascent stage, we endeavor to arrest progress; by constitutional treatment suited to the strumous diathesis; by leeching and fomentation; and subsequently, by the application of iodine, or other discutients, or by slight counter-irritation. When matter has formed, an early evacuation is practised by incision; the wound being made as minute as possible, and in the direction of the folds of the neck, so that its cicatrix may escape observation. A common lancet is the preferable instrument. Sometimes, however, the use of potass is demanded; the integuments having been much undermined, and the gland requiring disintegration.

In the after-treatment of suppurations in the neck, cure is often delayed by over-dressing the part—covering it with too many envelopes—especially when the patient is not confined to the house. The object of such dressing is to conceal the state of matters from public observation, and to guard against exposure to cold; but the result often is, to maintain a degree of congestion in the part, favorable to continued suppuration, and unsuited to contraction and consolidation of the abscess.

When abscess has formed at all deeply in the neck, whether connected or not with glandular enlargement, evacuation by incision cannot be too soon had recourse to, otherwise serious mischief can scarcely fail to ensue. Fascia is made to slough; areolar tissue is broken down; the trachea and œsophagus are each liable to be opened into by ulceration; the jugular vein may communicate with the abscess; or, still more disastrously, by communication with the carotid artery the cyst of the abscess may be converted into the sac of a false aneurism. And then, when the wound for evacuation—too long delayed—is at length made, the most serious consequences are inevitable[1] (*Principles*, 4th Am. Ed. p. 187).

Hematocele of the Neck.

Hematocele of the neck is not uncommon; originating in lesion of a superficial vein, and the contents of the cyst being more or less sanguinolent. The cyst is thin, superficial, and seldom of very large size. Usually the production of the swelling is sudden; and its progress in growth may be rapid; after a time, however, becoming stationary, and proving inconvenient mainly by its bulk. Tapping, with subsequent injection of iodine, may be tried; as in serous accumulations. Should this fail, a small seton may be inserted; or free incision may be practised, with subsequent granulation from the bottom of the wound.

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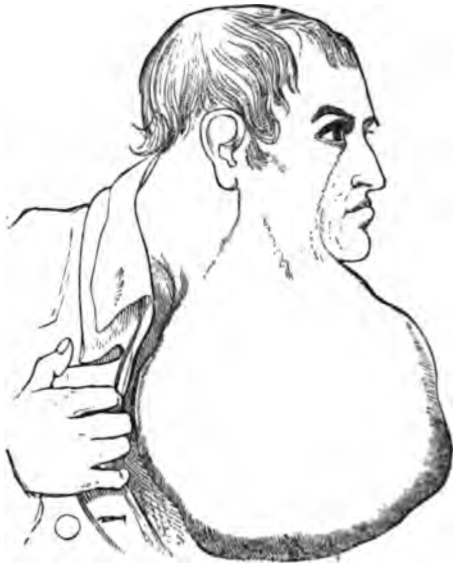
[1] Monthly Journal, June, 1855, p. 552.

In the necks of young children similar swellings are not unfrequently observed, altogether unconnected with blood or bloodvessels; the contents clear and albuminous.

Tumors of the Neck.

Solid tumors, when of such a nature as not to be amenable to discussion, call loudly for an early use of the knife, otherwise each day will but add to the difficulty and danger of the operation; and when at last matters are found to brook no further delay, it is not impossible but the hazard may be found so much increased as to render any attempt at extirpation quite unwarrantable.

Fig. 121.



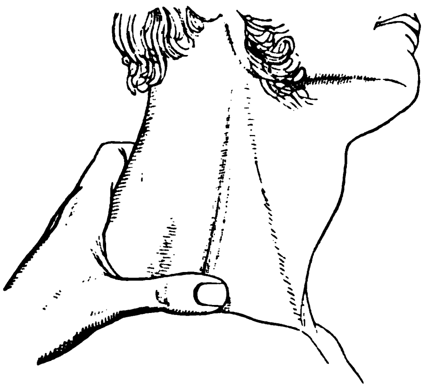
Large fibrous tumor growing from the neck. Was successfully removed.

In connection with this subject, it is well to remember, that in consequence of a tumor being bound firmly down by the deep and strong cervical fascia, it may seem to be less deeply seated than it is; and that, consequently, much caution is always expedient in conducting the dissection, it being not at all improbable that the common sheath of the large vessels may be fully exposed—perhaps to some extent.

Opening of the External Jugular Vein.

Occasionally it is deemed expedient to abstract blood by opening this vein, at its lower part. By pressure of the thumb, applied immediately above the clavicle, prominent bulging of the vein is produced; and then an incision is made, as in venesection at the bend of the arm. The thumb's pressure is maintained, so long as the flow of blood is desired; it is then withdrawn; and this circumstance, of itself, is usually sufficient to arrest the bleeding. But, besides, it is well to place a small compress on the wound; retaining it by means of a long strip of adhesive plaster, or by a bandage very lightly applied. During the blood's flow, precaution is advisable to avoid entrance of air into the vein (*Principles*, 4th Am. Ed. p. 539).

Fig. 122.



Venesection in the neck. The external jugular shown distended by pressure of the thumb, previously to insertion of the lancet.

Torticollis.

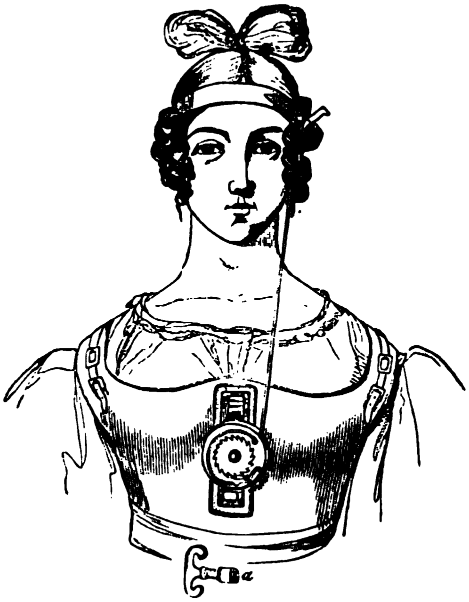
By this term is understood a distortion of the neck, dependent on muscular disorder—spasm, paralysis, or change of structure. The muscle usually to blame is the sterno-cleido-mastoid. One, acting with the undue energy of spasm, overpowers its fellow, and displaces the neck accordingly; or one, affected with a loss of contractility, fails to afford the usual counteracting power to its fellow; or, by the inflammatory process and its results, abbreviation and condensation of one or other muscle may occur, causing distortion of a very unpromising character; or the malformation is congenital.

Children, shortly after birth, are not unfrequently found to labor under a certain amount of torticollis, from the second cause; one of the muscles seeming either to have been inadequately developed, or somehow to have become partially paralyzed. Friction over the spine, and on the muscle which is weak—with care, on the part of the nurse, to exercise the faulty muscle by position of the head, yet without fatiguing the extensors—usually suffices to effect gradual but satisfactory amendment.

In a similar state of matters, in the adolescent or adult, the endermic use of strychnine, or the electro-magnetic stimulus, may be had recourse to.

Spasm of the muscle may be either temporary or permanent. The former most frequently occurs in children; and is to be treated by purgatives and alteratives, followed by antispasmodics internally; locally by fomentation, leeching, and counter-irritation. Permanent spastic rigidity of the muscle is more common in the adolescent and adult; perhaps a remote consequence of the former affection. Mercurial friction and active counter-irritation may be tried; but with no sanguine hope of success. Sooner or later, tenotomy has to be employed; and that not merely on account of the deformity, but to avoid a more serious evil—curvature of the spine—which often supervenes, and which may, if unchecked, become both extensive and confirmed. The needle is inserted obliquely, at the origin of the muscle from the sternum and clavicle; and division is effected by cutting either from without inwards, or in the opposite direction, as circumstances may seem to require; great care being of course taken not to injure the important parts which lie immediately behind that part of the muscle. To insure safety in this respect, it may be well, in some cases, to puncture with the ordinary tenotomy-needle or knife; and then, withdrawing this, to substitute an instrument with a probe-point wherewith to effect the muscle's section. Sometimes it may be sufficient to cut only one origin; but, usually, division of both heads is essential. By resilience of the severed extremities, restoration of the normal state is at once produced; and this is maintained by suitable bandaging, if need be, until consolidation of the divided parts occurs, with the due amount of elongation.

Fig. 123.



[Professor Jörg's Apparatus for Torticollis. *a*, the key.]

[The apparatus of Professor Jörg, here represented, may be used with advantage in obstinate cases. It consists of a pair of leather corsets for the chest, and a firm band to encircle the head—the two being connected by a steel rod; the rod is moved by a rachet-wheel, so that the head may be inclined towards either side; the wheel is turned by a key.]

A similar operation is the only means whereby we may expect to cure the third form of the affection; that proceeding from structural change by inflammation and its results.

Twisting of the neck is caused also by tumors—glandular and others; as well as by the contraction of extensive burns. The principles of treatment in these cases are obvious.

Wounds of the Throat.

Wounds of the throat are of two classes: those inflicted by the hand of the suicide, or the murderer; and those made by the surgeon. The former now engage our attention. They are usually made in a transverse direction; and high in the neck—near or at the thyroid cartilage; the latter circumstance being probably connected with the popular idea, that, to effect extinction of life, it is sufficient to open the air-passage, and so cause suffocation. The extent and consequent importance of such injuries vary very much; from mere scratches, penetrating no deeper than the subcutaneous areolar tissue, to the most ghastly severing of all textures—almost to decapitation. Sometimes the incision is made immediately beneath the chin. Not unfrequently it is placed between the hyoid bone and thyroid cartilage; the mouth being opened into, and the air-passage left intact. Sometimes the weapon is drawn across, a little above the clavicle; and then, if any considerable depth be attained to, death is certain and immediate. Sometimes the knife, held as a dagger, is plunged into the lower part of the neck; to the imminent risk of the larger bloodvessels. But the region of the larynx is that which is most frequently involved.

The first danger is by hemorrhage. If the carotid and jugular have been reached, death is very speedy, and may scarcely be prevented. Such extreme wounds, however, are of comparatively rare occurrence; the vessels being protected, high in their course, by the depth of their situation in reference to the front of the neck, and by the density of the parts which have to be divided ere the sweep of the sharp edge can reach them. When, however, the deed is attempted with a truer skill and deliberation, not by a horizontal gash, but by a puncture in the direction of the vessels, the escape of these is likely to prove rather the exception than the rule. A more limited transverse wound, leaving the carotid and jugular intact, may still cause death by hemorrhage, directly, and within a brief period; by implication of the thyroid vessels—arteries and veins. And again a comparatively slight bleeding may prove fatal, more remotely; blood trickling into the larynx, and accumulating within the air-passage, so as to induce asphyxia; such accumulation being permitted by the insensibility of the patient, or by his inability, through faintness, to make the requisite efforts for expectoration.

The second danger is by inflammatory changes, at the wounded part; occluding the laryngeal aperture or canal, or otherwise interfering with respiration. And this is all the more likely to occur, if the wound have been brought together tightly, with an imprudent haste. The mucous membrane, as well as the rest of the wound, becomes the seat of an acute inflammatory process; and the consequent swelling may be such as to cause rapid and great occlusion. At the same time, mucous secretion is both increased in quantity and vitiated in quality—becoming more viscid and tenacious. This, accumulating in the already narrowed canal, renders suffocative hazard all the more imminent. And the risk is further contributed to, by the diminished power of expectoration which a patient so situated necessarily possesses.

A third danger, liable to occur along with, and to aggravate that which has just been considered, is—that during the movements of the part—voluntary and involuntary—one portion of the wound is not unlikely to overlap the other, and thus by suddenly producing a mechanical obstruction to the passage of air, at once to bring life into the greatest peril.

A fourth danger is by the occurrence of inflammatory change in the trachea and lungs; the inflammatory process extending downwards from the wound, or the unwonted direct access of cold air proving an exciting cause of original affection. Bronchitis, indeed, more or less severe, is almost an invariable consequence of such injuries.

A fifth danger arises from inanition, in those cases in which the gullet has suffered; and when, consequently, it is not easy to maintain a due supply of nourishment. Hectic, also, may ensue in the case of an extensive, profusely suppurating, and slowly healing wound; more especially if much blood have been lost at the time of the infliction of the injury.

And lastly, the mental condition is, in all cases, likely to exert an untoward influence on the bodily frame. In not a few examples, when dissipation has led to the rash and guilty act, life is perilled at an early period by the occurrence of delirium tremens. Or this, indeed, may have been some time in progress, and may have caused the suicidal attempt. And in those cases which have been preceded by gloomy, brooding despondency, a continuance of low mania, accompanied with typhoid symptoms, will usually paralyze our best remedial efforts, and determine a fatal issue by sinking.

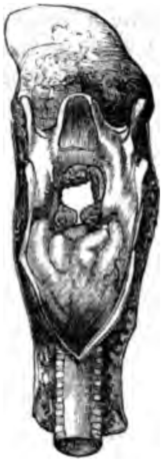
Thus it can be readily understood, how few cases in Surgery present more obstacles to satisfactory treatment than do those of cut throat. We overpass one difficulty and danger only to meet another. And too frequently, after the most prominent evils have been skilfully counteracted, the patient slowly yet surely sinks under obscure typhoid symptoms, intimately connected with mental alienation.

Treatment.—When called to a case of cut throat, it is obviously our first duty to arrest the hemorrhage. And this is done by ligature of the arterial orifices; pressure being applied, if need be, to venous points. Then the wound is to be approximated by suture; not wholly, but in part. The angles are drawn and kept together; but the centre of the wound is left free, approximation there being effected solely by attention to position of the head—keeping the chin, by bandaging if necessary, depressed towards the sternum; and even this is not done until all bleeding from the wound has ceased. If the chasm be at once drawn tightly together, immediate risk is greatly enhanced, as already stated; and yet this is an error very frequently committed, in the hurry of actual practice. Blood, oozing from the cut parts, does not find a ready escape externally, but either trickles into the air-passage and accumulates stealthily there; or is infiltrated around the line of wound, causing compression of the windpipe by the increasing coagulum; in either way threatening suffocation. The viscid mucus, too, is more likely to entangle itself in the shut wound; and inflammatory turgescence is more prone to prove untoward. Air, also, is likely to be infiltrated into the areolar tissue, during expiration; causing troublesome and dangerous emphysema. When, on the contrary, the wound is left centrally free, these latter risks are not only less likely to occur; but also, in the event of their occurrence, untoward tendency can be much more readily and effectually counteracted. It need scarcely be added that the dressing of the wound should be most simple; consisting, not of a complication of plaster, compress, and bandaging—but of a mere strip of lint, moistened in water, and loosely and lightly retained upon the part.

The main bleeding having been secured, and the wound partially approximated, the patient is laid on his side so as to favor outward escape of the continued oozing. And the cut part is protected from unfavorable atmospheric impression, by a covering of loose gauze, or of woollen texture, thrown lightly over the neck; attention being at the same time paid to maintain an equable and genial temperature in the apartment. Duly qualified attendants are at hand not only to guard against repetition of the suicidal attempt, but also prepared to separate and clear the wound, should swelling and entanglement of mucus render such a proceeding necessary to prevent suffocation. And the patient should be instructed to facilitate his expectoration, by completely shutting or very much diminishing the wound, by means of his fingers, at the time of the effort being made. It is hoped that the wound will inflame, granulate, contract, and cicatrize, in the ordinary way; and the local treatment is conducted with that object in view. Constitutionally, we have to guard against favoring inflammation in the wound, and in the air-passages, by neglect of antiphlogistic measures; and, on the other hand, we must beware of aggravating the tendency to sinking which sooner or later becomes apparent in the majority of cases. As a general rule, bloodletting from the system is seldom if ever warrantable.

Should the pharynx or œsophagus have been wounded, the use of a tube becomes necessary to convey nourishment to the stomach. In the ordinary effort of deglutition, the ingesta would necessarily escape more or less copiously by the wound, and so do harm in many ways. The feeding-tube cannot be inserted from the wound—although the facility of such a proceeding may invite the attempt—otherwise closure of the wound must be seriously interfered with. If intended to be introduced and worn permanently, until the pharyngeal or œsophageal aperture shall have closed, it is to be passed by the nostril. But it is found to be more expedient to introduce the tube only occasionally, by the mouth; twice or thrice daily, as circumstances may seem to require. It is not necessary to pass the instrument completely down to the stomach; it is

Fig. 124.



"A view from behind of the larynx of a patient who some weeks previously attempted suicide, by wounding the fore part of the neck. By some mismanagement, the edges of the incision were kept asunder; and they cicatrized. The patient was seized with difficult breathing; the inspirations were rare, long, and laborious; and he had threatening of suffocation during his disturbed sleep. These symptoms were disregarded. He started up suddenly in the night, caught hold of the patient in the next bed, and fell down in a state of asphyxia, from which he could not be recovered. The œdematous swelling of the rima glottidis is remarkable; beyond that, is seen the rounded opening betwixt the thyroid cartilage and epiglottis—which last is in a normal state."—Liston, Elements, p. 432.

enough that its extremity is placed fairly beyond the wound. And, of course, the precaution is not neglected of ascertaining that lodgment is rightly accomplished, ere fluid nourishment is begun to be introduced. One very obvious objection to the permanent retention of a tube, whether passed by the mouth or by the nose, is that its extremity, pressing against the posterior part of the windpipe, is apt to occasion ulceration there, which may perforate; complicating the case untowardly, by the establishment of tracheal fistula. Should this occur—as has happened—the ordinary test of the tube being rightly placed will probably fail; air, in expiration, escaping by the tube in the œsophagus, as well as by the natural outlet.

Throughout the whole cure, the state of respiration must be sedulously watched. And should threatening of suffocation supervene—as is not unlikely—and prove of such a nature as not to be removed by attention to the state of the wound, tracheotomy is to be had recourse to unhesitatingly. Then the canula being retained in the tracheal wound, the transverse aperture may be brought together, and treated so as to favor rapid union—there being no longer any risk from internal swelling or other change at that site.

I have often thought, that in extensive transverse wounds of the neck, implicating the windpipe, however inflicted, tracheotomy may be regarded as expedient at an earlier period; that is, shortly after arrest of the hemorrhage, and partial approximation of the wound; so soon, in fact, as the patient has rallied sufficiently to bear the immediate effects of the operation. For then we would have it in our power to place and maintain the whole track of the wound in perfect apposition, and perhaps to procure union almost by the first intention. So soon as the chasm had fairly closed, the canula might be withdrawn, and the tracheal opening cautiously and gradually closed. And thus, also, would we be more likely to avoid the occurrence of fistulous tendency in the suicidal wound; which, in the ordinary progress of cure, is not unlikely to prove troublesome. In performing the operation, it will be expedient to raise and steady the windpipe, by means of a hook fixed in the lower margin of the transverse wound.

In those cases which recover, there is a risk of the larynx becoming contracted in its calibre, so as seriously to interfere with normal respiration; and all the more probably, if there be at the same time a fistulous opening established by imperfect closure of the wound. Such cases are doubtless unpromising; yet are capable of being brought to a prosperous issue. The contracted passage may be dilated by bougies passed from the mouth; and, the normal capacity of the larynx having been restored, the fistulous opening may be made raw, and approximated by suture. A successful case of this nature occurred in the practice of Mr. Liston.[1]

Bronchotomy.

Under this general term are comprehended the surgical wounds of the throat—Laryngotomy and Tracheotomy; made in a longitudinal direction; artificially opening the windpipe, with some important remedial object in view. But before treating of these operations, it may be well to consider briefly the various circumstances which may demand their performance.

Foreign Bodies in the Windpipe.

Foreign bodies, held in the mouth, are apt to pass into the windpipe, during sudden inspiration—as in speaking, crying, or laughing. During inspiration, the glottis is opened wide, and a foreign substance, even of considerable size, may pass readily inwards. For expiration, however, a comparatively narrow opening of the rima suffices; an aperture quite insufficient for the outward escape of the intruding substance; and, indeed, such escape is still further opposed by the effort to produce it, which, impinging the foreign substance on the tracheal aspect of the rima, stimulates that part to spasmodic contraction.

The foreign substance may remain loose within the windpipe; moving from part to part, according to the circumstances of displacement. Or it may lodge at a particular site:—1. In the larynx; becoming entangled in the ventricles; or being of such form and size as to be impacted in the general cavity. 2. It may be similarly fixed across the trachea; pins, portions of glass, and other sharp substances, for example, have been thus impacted. 3. In either bronchus. And the right being the more directly continuous with the trachea, in that the impaction is most likely to occur. 4. Or the body, of small size, may gravitate still lower, and take up a lodgment in one or other of the bronchiæ. 5. Or it may be impacted in the very rima glottidis. Thus:—a man much intoxicated, becomes almost insensible, and is sick. The contents of the stomach are lazily evacuated upwards; and a portion of the ingesta may enter the rima and remain there, causing suffocation. A piece of potato-skin has thus proved fatal. Or, again, large substances, held in the mouth, and forced downwards in sudden inspiration, may prove too bulky to pass through the rima, and become impacted there; inevitably causing suffocation, unless instant relief be obtained, either at the hand of Surgery, or by the patient's own expulsive efforts. And in such a case, unless the tightness of impaction be great, success is more likely to follow the instinctive throes, than in the case of smaller bodies within the larynx; spasm of the glottis being mechanically prevented, and consequently proving no obstruction.

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[1] Liston's Elements, p. 435.

The symptoms denoting the occurrence of such accidents are, in general, tolerably distinct. If impaction have taken place in the rima, the symptoms are those of rapid asphyxia; the patient suddenly exhibiting the greatest distress, becoming livid and swollen in the countenance, staring with bursting eyeballs, gasping anxiously, struggling for breath, and speedily becoming insensible. When the foreign body has passed within the rima, the symptoms vary according to the site and nature of the lodgment; but, in all cases, they evince two leading characteristics —denoting obstruction to respiration, and irritation produced in the part with which the substance is in contact. If it be loose in the windpipe, or lodged in the larynx or upper part of the trachea, the following are the ordinary symptoms. A violent fit of suffocative cough immediately succeeds the entrance of the foreign body—seeming to cease, it is probable, only on nature having been wholly exhausted. And, at short intervals, such paroxysms are renewed; more particularly if any new movement of the foreign body have occurred. Inspiration is loud, strained, and of a harsh, croupy, or sawing sound. The voice is changed. Pain is complained of in the part. A more or less copious expectoration of mucus takes place, and sometimes of blood. The countenance is suffused, and expressive of great anxiety—an expression almost pathognomonic, especially in the young. And the neck is stretched, with the head elevated and thrown back, in the position of orthopnœa. Often all the auxiliary muscles of respiration are found in full play. It is right to remember, however, that in some cases—more especially when a considerable period has elapsed since the occurrence of the accident— the intervals between the paroxysms may be passed in comparative quiet, with an almost total absence of symptoms at that time. When impaction has taken place in a bronchus, a characteristic sign is indicated by auscultation—suppression of respiratory sound on that side, with puerile respiration in the opposite organ. The respiratory movements of the parietes of the chest, too, are diminished or arrested in the obstructed part. Or a still more plain indication may be afforded, if the substance happen to be of musical capability, however rude, and so situated that the air passing by it in respiration may evoke its powers of sound. Rough substances soon occasion purulent discharge, which possesses great and characteristic fœtor. Sometimes the foreign body, when smooth and loose, may be felt distinctly impinging against the upper part of the larynx, during a convulsive effort at extrusion.

The affection with which this accident is most apt to be confounded, is rapid obstruction of the upper part of the windpipe by inflammatory change. But the history of the two cases must necessarily be very different; urgent symptoms being in the one case immediate, unaccompanied with febrile excitement of the system, and often most intense at first; while in the other they are more or less gradual in their accession, of a crescent character, and invariably attended with inflammatory fever. Also, in the accident, expiration is difficult, while inspiration is comparatively easy; whereas, in the disease, the precisely opposite condition obtains.

That in all cases there is a necessity for the speedy adoption of measures calculated to effect removal of the foreign body, is tolerably lain. Otherwise, the risks to life will be neither few nor slight. 1. Sudden suffocation may occur, at a very early period, by impaction of he substance in the upper part of the larynx—as already shown. 2. Imperfect respiration may more gradually induce a fatal issue; in conequence of partial obstruction caused by the foreign body, and accumuation of mucus at the incommoded part. 3. Laryngitis or tracheitis nay be excited, of formidable character. 4. Congestion may take lace in the lungs; followed perhaps by apoplectic disruptions of the ulmonary tissue, or by pneumonia, or by bronchitis; and it is well to emember, that a foreign body lodged in and irritating the bronchus, nay cause fatal disease of the lung—the site of the lodgment itself inact.[1] 5. A foreign body of small size may perforate a bronchus or ronchial tube, and lodge in the pulmonary tissue; and acting untowrdly there, as all foreign substances must, may cause abscess, or lay he foundation for tubercular deposit and fatal phthisis. 6. Or the pasage outwards may be more advanced. The lungs may be passed hrough, and the cavity of the pleura reached; and empyema may be he result. No doubt, it has happened that yet another step has been aken; the foreign substance has perforated the walls of the chest, by edious ulceration, and been discharged externally. And it has also appened that a foreign body has been expectorated by the mouth, along ith purulent matter, at a long date from its introduction. But such ecurrences are much too rare to warrant their use as precedents in determining the appropriate treatment.

If the violent efforts of the patient fail to dislodge and extrude the oreign body—as is not unlikely—recourse must be had to bronchotomy; nd through the artificial opening in the windpipe the foreign body is ought to be extracted. Before proceeding to this operation, however, t is well in cases of comparative obscurity to explore the pharynx and ullet, in the first instance. Urgent symptoms of dyspnœa, we have lready seen, may be caused by foreign substances lodged in either of hese passages; thence compressing, irritating, and obstructing the airassage. And experience has shown that a foreign body, not bulky nough to cause dangerous compression, may lodge near the rima, and xterior to it; may cause many of the ordinary symptoms of a foreign ody within the windpipe; and that in such a case, while bronchotomy nust necessarily fail, expulsive efforts, duly aided by the surgeon, are nost likely to succeed.[2]

Also—in children especially—when the lodgment of a small round ubstance, such as a pea, is suspected, and when much bronchitic secreion is oppressing the chest, it is well to premise full vomiting, by means f ipecacuan. Along with the vitiated mucus, the offending body has ometimes been expelled.

When the foreign body is of small size, and plainly indicated by the ymptoms to be either loose in the air-passage, or fixed in the upper art of the larynx, laryngotomy may be had recourse to. It is of easy erformance; and, though an aperture through the crico-thyroid space e necessarily of limited dimensions, it is probable that through that space such a foreign body may be readily enough removed. In all other cases, however, tracheotomy, though a more troublesome operation, is for obvious reasons to be preferred; the aperture is more free, and the facilities for extraction, both from below and from above the opening, are manifestly greater.

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[1] Monthly Journal, November, 1852, p. 449.

[2] Lancet, 1069, p. 729.

When the foreign substance is loose, it is usually expelled forcibly by the outward current of air, so soon as the operation is completed. But if fixed, it must be sought for, and removed artificially. If lodged above the opening, a common probe is the most convenient instrument for exploration. By it the site is detected; by it the foreign body may be pushed through the rima—to be coughed up; or loosening is effected, with subsequent expulsion through the tracheal wound. When the site of lodgment is in the bronchus, long curved forceps—such as recommended for extraction of foreign matter from the pharynx and œsophagus—are very suitable for both exploration and extraction. Auscultation and percussion having previously imparted to the operator a shrewd suspicion of the site of lodgment, the instrument is passed down shut, and made if possible to impinge on the foreign substance; then, slightly withdrawn, the blades are opened; and, pushing on again gently, the object is probably grasped; if not, the other forceps—opening in an opposite direction—is similarly employed, with almost a certainty of success. The wound is kept open, until bleeding has ceased; it is then brought accurately together by adhesive plaster, and adhesion hoped for.

But the air-passage may prove intolerant of the forceps; and perseverance in their use, searching for a foreign body, might peril life by violent paroxysms of dyspnœa.[1] In such cases, modern experience has pointed out a safer mode of procedure[2]—more especially if the foreign body be of some weight, as a stone, coin, or any piece of metal. The tracheal wound being kept open, let the patient's body be inverted, so as to make the head dependent; and, if need be, let succussion of the frame be had recourse to, so as to favor dislodgment of the offending substance, and its descent towards the larynx by gravitation. Arrived at the rima, it will not find its outward passage there obstructed by spasm, nor will a paroxysm of dyspnœa be induced; for, the opening in the trachea has the effect of obviating this difficulty and danger. Escape is made readily into the mouth, and thus extrusion is effected with both ease and safety.

It has been proposed to supersede bronchotomy altogether, by the preceding manœuvre. But such a proposal does not seem to be a prudent one. In most cases the attempt would probably fail, and life be imminently perilled, the foreign body being obstructed by spasm at the rima, and perhaps becoming impacted there. The proceeding is suitable only when the foreign body is small, smooth, and of high specific gravity; and seems to be in all respects safe, only when a tracheal aperture has previously been established; and when, in consequence, irritability of the rima has been assuaged, and accident by impaction there fully provided against. A case or two of accidental success[1] will not suffice to overthrow the general principle here inculcated.

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[1] In using the forceps, anæsthesia is obviously calculated to prove of much service; rendering exploration both easy and safe. In applying the chloroform, it will be necessary to place it over the wound as well as on the mouth.—See a case by Dr. Johnston, of Montrose, Lancet, No. 1478, p. 600.

[2] Lancet, 1063, p. 502.

It may happen that some considerable time—weeks or months—has elapsed since introduction of the foreign body, before aid is requested. Such lapse of time need not deter the surgeon from operating, if other circumstances prove favorable. For experience has shown that removal of the offending matter, even at a distant date, may be sufficient to avert all serious ulterior consequences.[2]

Asphyxia.

In attempting resuscitation from asphyxia, it is necessary to maintain artificial respiration; and this is effected, in ordinary cases, by insufflation of air through the mouth or nostrils (*Principles*, 4th Am. Ed. p. 654). [See Marshall Hall's "Ready Method," or "Postural Respiration," Am. Jour. Med. Sci., July, 1856, from Lancet, Apr. 12, 1856.] But were the rima glottidis spasmodically closed, such ordinary means would be likely to inflate the stomach only, leaving the lungs unaffected. Under such circumstances, therefore, one of two proceedings is necessary; to pass a tube into the windpipe from the mouth; or to perform bronchotomy. The operation of passing a tracheal tube is always difficult; and becomes especially so, even in an insensible patient, if the rima be closely shut—as in the case of suffocation by carbonic acid. It can readily be understood, therefore, how in many cases such an attempt is well superseded by the operation. Usually laryngotomy will suffice. One caution must be particularly attended to; namely, to prevent blood from entering by the wound, and accumulating in the air-passages. And should such entrance have been effected, means should be taken, by suction applied to the wound, to accomplish its expulsion.

In cases of *Suspension* by the neck, it is plain that bronchotomy cannot avert a serious result, and may probably fail in the attempt at resuscitation. For, the case of death is not from constriction of the windpipe only; but by concussion of the brain and spinal cord, and by interference with the jugular circulation. And these latter circumstances may of themselves be sufficient to produce a fatal issue, independently of direct interference with respiration. Seldom does any displacement occur in the cervical vertebræ.

Injuries of the Larynx.

A blow on the larynx may directly peril life by arresting respiration. The rima glottidis may be wholly shut, either by spasm of the occluding muscles, or by paralysis of their antagonists—more probably by paralysis of all the muscles concerned; or it may be but partially occluded, yet with such a tumult and difficulty of respiration as to render the case of great and immediate hazard. And, under such circumstances, it is plain that the only prospect of relief is by tracheotomy—opening the windpipe below the injured part; the aperture being kept patulous, until the organ has recovered, and is able to resume its wonted functions in normal respiration.

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[1] Northern Journal, Feb. 1845, p. 220.

[2] London and Edinburgh Medical Journal, August, 1842, p. 722; and Liston's Practical Surgery, p. 371.

Rupture of the trachea, by external injury, may prove fatal, by rapid and extensive emphysema; the pressure of this producing asphyxia more or less rapidly. By making many and early punctures in the affected part—or by incision—we may give an outward escape to the air, and so avert the threatened disaster.

Apoplexy of the larynx may occur; blood being infiltrated copiously beneath the mucous membrane. Symptoms may be urgent, simulating croup or œdema glottidis, and so threatening asphyxia as to render relief by bronchotomy inevitable.[1]

The *thyroid cartilage*, ossified, may be fractured by external violence, and serious consequences ensue; requiring active antiphlogistics, and perhaps tracheotomy eventually.

The Accidental Swallowing of Boiling Water, Acids, or other Irritant Fluids.

It is common, among the poorer classes in some localities, to have but one vessel, a large kettle, to hold water for culinary purposes—sometimes cold, at other times hot, according to circumstances. A child, accustomed to have its thirst assuaged from such a source, is likely to help itself, when no one else is near; and, in doing so, may unhappily fill its mouth with fluid of a boiling temperature. Instantly an attempt is made by the little sufferer to eject the fluid; and in the backward movement of the hot water, partial entrance into the open rima glottidis is not unlikely to occur, during the expulsive paroxysm. The result is a scalding of the air-passage, as well as of the pharynx and upper part of the œsophagus; and by swelling in the former situation, during the subsequent inflammatory process, the most serious results may ensue.

Adults may swallow acids or other acrid fluids, either by accident or intentionally. In the latter case, the air-passage is seldom injured. The determination to the act of swallowing shuts the glottis, and the fluid passes downwards in the gullet alone. But if a patient accidentally attempt to swallow a fluid of this kind, mistaking it for some other of a harmless nature, the expulsive effort is instantly made—as in the case of the child with hot water; the glottis is opened in the paroxysm, and the noxious fluid effects a partial entrance there.

The treatment of such cases requires to be conducted with an energy proportioned to the urgency of their nature. The inflammatory process may not be prevented; but it should be our anxious endeavor to moderate and delay its onset, and to effect its speedy retrocession. The most active antiphlogistics are employed—immediately; bleeding from both part and system; outward fomentation; antimony. It may be that by such means the progress of inflammatory tumescence may be restrained, so as not to affect respiration urgently, and that inflammatory extension from the parts first involved in the air-passages in general may be prevented. If, however, antiphlogistics fail, and asphyxia threaten by obstruction in the larynx, tracheotomy is to be had recourse to; at once; not reserving the operation, especially in the child, until by extreme urgency of the symptoms it cannot possibly be longer delayed, and recovery is rendered more than problematical by congestion in the brain, in the lungs, or in both. Laryngotomy is plainly unsuitable; to practise that, would be to cut into the affected part, and to fulfil very imperfectly, if at all, the object of the operation. The wound of tracheotomy, on the other hand, is below the seat of disease, the affected part is put at rest, life is saved from asphyxia, and the inflaming larynx, by being allowed quietude, is powerfully aided in the resolutory effort. On decadence of the inflammatory process, and when absorption, clearing away all swelling, has restored the normal state of the organ, the tube is withdrawn, and the wound permitted to close.

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[1] Monthly Journal, August, 1847, p. 1:6.

Spasm of the Glottis.

It has been already stated how bronchotomy may be highly available in the case of spasmodic closure of the glottis, threatening asphyxia; as in poisoning by carbonic acid.

Laryngismus Stridulus, a spasmodic affection of the windpipe, not uncommon in children, and occasionally met with in the adult, may in its paroxysms threaten suffocation; and, in such circumstances, the question of the expediency of bronchotomy comes to be entertained. In general, the operation is to be withheld, unless the circumstances prove extremely urgent; and it is then employed as a means of palliation and protraction, rather than of cure. And more especially will the prognosis be guarded and unfavorable, if there be reason to believe that the spasmodic attacks are dependent on irritation produced by structural change at a low part of the windpipe; as by enlargement of the thymus gland, affection of the bronchial glands, aneurism, or other formation of tumor. In one form of aortic aneurism, when the tumor is small, and does not compress and contract the air-passage, but acts on the larynx irritatingly by implication of the recurrent nerve, causing suffocative paroxysms of spasm in the glottis, it seems very proper to have recourse to tracheotomy early, with a certain hope of relief, and a prospect of even something more than mere palliation. But when the tumor is large, compressing and contracting the air-passage, and causing continuous dyspnœa, the prospect is not so favorable, and the grounds for operation are scarcely sufficient, probably, to warrant its performance.[1]

It were out of place, in such a work as this, to enter fully into the various interesting and important affections of the windpipe. But it is right to notice them briefly, in connection with the operation of bronchotomy; the leading features only being stated.

Laryngitis.

The inflammatory process, occurring in the larynx, may be either chronic or acute.

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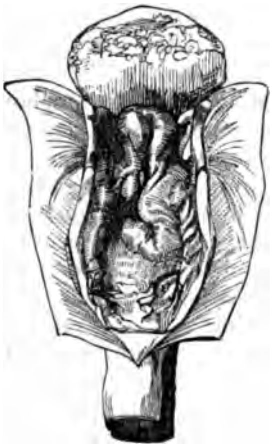
[1] Monthly Journal, Aug. 1851, p. 185. *Ibid.* Feb. 1853, p. 114.

1. ACUTE LARYNGITIS. *a. Laryngitis simplex.*—There is, in this affection, more or less turgescence of the mucous membrane, with the accustomed change of secretion—the results of a minor amount of the inflammatory process; but the swelling is diffused uniformly, and not at any part great, and the secretion is not liable to be retained and accumulated; no paroxysm of dyspnœa threatening suffocation is likely to be caused by such changes; and, consequently, in this affection the direct interference of surgery, by bronchotomy, is not required. Medical treatment suffices.

Fig. 125.



Acute œdema glottidis; exposed from behind.

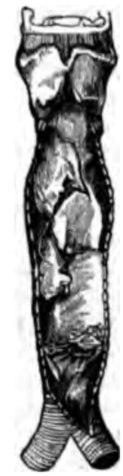
b. Laryngitis Œdematosa.—This is the acute *Œdema Glottidis;* an inflammatory process attacking the larynx, and rapidly causing much bulging of the lining membrane by serous and fibrinous infiltration of the submucous tissue; active congestion being rapidly reached, and persisting of high intensity (*Principles*, 4th Am. Ed. pp. 97 and 103). In consequence of such change, the characteristic symptoms are soon developed; increasing dyspnœa, liable to paroxysmal exacerbation; inspiration protracted, labored, stridulous; expiration comparatively easy and silent; anxiety of countenance, &c. And besides, there is ultimately afforded to the surgeon a more plain indication; inasmuch as the œdematous swelling may be felt, on the epiglottis and glottis, by the finger introduced from the mouth; and may even be seen, on depressing the tongue forcibly by the speculum. Practically, the disease may be divided into three stages. 1. There is one condition of laryngitis simplex; while the affection has not proceeded beyond turgescence, and when there is no obstruction to breathing. But this state is quickly overpassed, in most cases. 2. The characteristic œdematous swelling is forming; not diffused and uniform, but mainly affecting the glottis, and its immediate neighborhood, and causing prominent bulging there. Respiration is now more or less impeded; and obstruction is on the increase. 3. Breathing having been for some time seriously interfered with, and aeration of the blood imperfectly performed, untoward results begin to manifest themselves in both lungs and brain—congestion, followed by serous effusion; the threatening of asphyxia is aggravated by threatened supervention of coma. Most frequently the obvious cause of death is by the former event; obstruction by mucous swelling becoming greatly augmented by accumulation of viscid mucous secretion, a paroxysm of dyspnœa is induced; in the tumultuous disorder of respiration that ensues, it is not improbable that the patient may drop asphyxiated; and recovery from that state will be seriously affected by the cerebral change already in progress. In other cases, the fatal issue is more gradual; asphyxia steadily advancing, without paroxysmal aggravation.

The suitable treatment is active throughout. At first ordinary antiphlogistics are plied industriously; bloodletting, antimony, calomel, and opium. These may arrest the affection in its first stage. If not, let them be persevered with; for they may yet mitigate the swelling, prevent the occurrence of urgent symptoms, and procure a favorable resolution from the second or characteristic stage, without life having been ever seriously endangered by threatened asphyxia. In this stage, however, be it remembered, bloodletting must be had recourse to with very considerable caution; it being well known, from experience, that there is an intolerance of this remedy, heroically employed, in all cases in which respiration is seriously obstructed. Let mercury take the place of loss of blood; and by it, judiciously employed, let us hope to limit deposit and promote absorption successfully, and thus to make a satisfactory impression on the œdematous bulging. Not seldom marked benefit will follow free scarification of the epiglottis and lips of the glottis, by means of a curved knife; the tongue being fully depressed by the mouth speculum, so as to render these parts accessible to such procedure. Should, however, resolution fail to follow on the use of such means—the symptoms proving both crescent and grave—let bronchotomy be at once had recourse to; regarding the operation as truly a part of the remedial treatment, whereby the peril of extreme urgency may be avoided, not as a last resource whereby a life half lost may only perhaps be regained. Tracheotomy is plainly to be preferred; for thus only can we place the artificial opening beneath the seat of obstruction, so as to effectually avert the immediate danger by impending asphyxia; and thus only can we fulfil the very important indication of placing the affected part in the state of comparative quietude and repose, so suited for facilitating resolution and recovery. The medical treatment is not interrupted meanwhile. In due time it tells favorably on the swelling. This begins to subside; and then the use of the tube may be begun to be discontinued, introducing it only occasionally. Ultimately the part recovers itself wholly as to swelling; and then, the tube having been finally withdrawn, the wound is approximated and encouraged to heal. During the first hours of the tube's use, great care is necessary in keeping the aperture clear; viscid mucous is being copiously secreted; the power of expectoration being very weak, occlusion of the artificial rima is apt to ensue; and such risk by sudden asphyxia is all the more likely to occur, if the patient have fallen asleep shortly after performance of the operation—as often happens. More than one day and night may have been passed in sleepless anxiety, pain, and distress; and the relief at once experienced, after the first effects of the tube's introduction have passed away, is apt to lull the relieved sufferer into a deep and unconscious slumber—from which it were hard to be awakened, abruptly, only to perish by suffocation. The attention of a qualified attendant must be constant, to maintain clearance of the tube, until the excessive secretion of mucus has diminished, and the power of expectoration been regained.

In this affection, then, let tracheotomy be had recourse to, so soon as it is plain that medical treatment has failed to effect timeous resolution. Do not delay, until both lungs and brain have been so far involved, as to render recovery under any treatment at that stage more than doubtful.

c. Laryngitis Fibrinosa is usually combined with a corresponding morbid state of the trachea—tracheitis fibrinosa—constituting *Croup*. This, too, may be conveniently divided into three stages. 1. Again the laryngitis simplex, but of greater intensity than in the previous case, and with a marked tendency to spread along the mucous membrane downwards. 2. The fibrinous exudation begun; aggravating all the symptoms, and affording serious obstruction to breathing. 3. The lungs and brain implicated, as in the former case, by reason of the continuance of impeded respiration. The former organs, however, in this case are exposed to an additional source of danger. The inflammatory process, by continuous extension, may have reached the bronchial ramifications; and to the oppression of the lungs' play, otherwise occasioned, the additional and serious complication of bronchitis may be added.

Fig. 126.

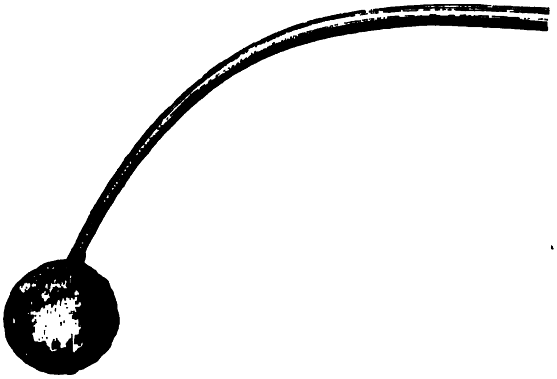


Example of false membrane, in Croup. Its evil consequences very apparent.

In the first stage, medical treatment is practised, as in the corresponding period of the previous affection. There is no demand for bronchotomy, on account of urgency of symptoms connected with respiration; and the spreading acute inflammatory process is not likely to be limited in either its extent or intensity, by the infliction of a tracheal wound, and retention of a foreign body therein. In the second stage, the symptoms are sufficiently urgent to call for any aid which our art can afford. Tracheotomy will give a more direct and free entrance for air passing towards the lungs, than through the affected larynx; and the larynx will be placed in a state of comparative rest, favorable to recovery. But the same good result does not follow as in the case of acute œdema glottidis. The disease is not limited to the larynx, but has passed the site of tracheal wound, and is already established, too probably, in the bronchial tubes; the wound is made —not in a comparatively sound part, to afford rest to the superior portion of the canal—but in the midst of the disease, affording rest to but a part, and a minor part, of the disorder's seat, and inducing, by its additional stimulus, an aggravation of the whole. Air is let in towards the lungs, but with only a doubtful chance of reaching them; for by this time the bronchial tubes are clogged with viscid mucus, the bronchial membrane is itself swollen and infiltrated, the trachea is more less obstructed by false membrane, and perhaps, indeed, pseudo-membranous exudation has extended throughout almost the whole bronchial ramifications. Thus, the salutary indications are not fulfilled, and the operation fails of its expected issue. In the third stage, surgical interference must prove still more manifestly hopeless. In this disease, therefore, the practical inference from such considerations will be, that our principal confidence must be placed in medical treatment; that the operation of tracheotomy —laryngotomy being in all respects obviously unsuitable—cannot be expected to prove of either great or frequent service, but that if it be had recourse to, it should be during the second stage, when plainly medical treatment has failed to arrest or mitigate—and before the third stage has set in, rendering recovery under any circumstances all but absolutely hopeless. Recourse to the operation may be regarded, therefore, as the exception rather than the general rule.[1]

An operation of a simpler kind, and sometimes productive of benefit, has lately been advocated by Dr. Green of New York, and others; namely, the direct application of nitrate of silver, in strong solution, to the affected part. By means of a powerful spatula, the tongue is depressed and brought forwards; a bent piece of whalebone, tipped with sponge, and soaked in the solution (from two to four scruples of the salt to the ounce of distilled water) is passed behind the epiglottis, and then suddenly forced on into the larynx. The effect is twofold; mechanical clearance of the canal, the sponge withdrawing much mucus and exudation, and the nitrate exciting a curative influence on the affected membrane. At first, the presence of the foreign body is resented by unpleasant spasm and irritation; but these soon subside, and the operation may be repeated at such intervals as circumstances may seem to require.

Fig. 127.



End of the sponge-probang, for the larynx: the sponge always carefully affixed to whalebone not made brittle by the caustic.

But there are cases of *true* laryngitis fibrinosa, in which the affection is mainly limited, and the pseudo-membranous exudation entirely confined, to the larynx itself. These are few, certainly, compared with the ordinary examples of croup; still they do occur; and may be diagnosed by the absence of tracheal and pulmonary symptoms, and by the apparent concentration of laryngeal disorder. In such cases, if other treatment fail in the second stage, and symptoms are urgent, tracheotomy should be unhesitatingly practised, on precisely the same grounds as in acute œdema—and probably with the same fortunate result.

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[1] I am quite aware that authority is not wanting to enforce an opposite practice; Trousseau and Bretonneau, for example, warmly advocating the performance of tracheotomy in croup, and supporting their doctrine by an array of successful cases (Brit. and For. Rev. No. 23, p. 110). But, on this point, the question always obtrudes itself:—Were these cases all examples of true croup? For it is well known how loosely medical nomenclature is often applied; and as, by some, all sores on the penis are called chancres, all hard swellings on the breast dignified by the appellation of scirrhus, every suspicious fungus called fungus hematodes—so may all acute affections of the larynx be arranged under the general denomination of croup.

Diphtheritis, or *Cynanche membranacea*, may be said to be a variety of laryngitis fibrinosa. The aphthous exudation, however, and the affection which causes it, do not originate in the larynx, but in the mouth and fauces, thence spreading rapidly downwards. The lungs, through the bronchial ramifications, are early involved, and cannot possibly be relieved by a tracheal wound. Bronchotomy, therefore, is in this affection inadmissible.

d. Laryngitis Purulenta.[1]—In this, the inflammatory process is more advanced than in any of the preceding forms of acute laryngitis; true inflammation is reached, and its characteristic product exhibited. Fortunately such a result is of comparatively rare occurrence; and fortunately also, when it does occur, the affection is usually confined to the upper part of the larynx, and corresponding portion of the fauces. The matter is not limited in the form of abscess, but is diffusely infiltrated into the submucous areolar tissue. The membrane gives way, the matter is discharged, and an ulcerated surface remains. The symptoms and progress are very similar to those of acute œdema. And the treatment is to be guided by precisely the same principles. By medical treatment we hope to arrest the disease, in time to avert peril to life. If not, and dyspnœa increase threateningly, tracheotomy is to be performed, early, in the second stage as a *part* of the remedial treatment. The prognosis is favorable—as in œdema, when timeously relieved.

Acute ulceration of the larynx may result from this affection, as already stated; almost certain to be attended with more or less swelling; and consequently requiring the same surgical aid as the acute œdema glottidis.

II. Chronic Laryngitis.—This may be the result of an acute or subacute attack; more frequently it is chronic from the first. But, however originating, it is ever liable to sudden and acute aggravation, from comparatively slight causes; bringing life into peril—all the more immediately on account of the insidious and comparatively mild nature of the previous symptoms.

a. Thickening of the Mucous Membrane, resulting from what may be termed Simple Chronic Laryngitis, usually gives way to remedial treatment alone; leeches, counter-irritation, mercury, and other alteratives. Should an acute accession supervene—and to such the patient is constantly liable—obstruction to respiration may be speedily induced, threatening the most serious consequences. Under such circumstances, proportional augmentation of the medical treatment may fail to relieve; and then tracheotomy comes to be required.

As a general rule, when counter-irritation is employed in any affection of the larynx, it should be applied either laterally, or on the back of the neck, not in front. For, the remedial effect is the same; and it is obviously expedient to leave the site of tracheotomy clear and available, in the event of recourse to that operation becoming necessary.

b. Follicular disease of the larynx is an affection of great frequency; the disease being resident and in most cases originating in the mucous follicles. These are seen on the back of the pharynx, in various stages and forms of morbid alteration—hypertrophied, vesicular, pustular, ulcerated; and the presence of similar change within the larynx is marked by characteristic symptoms—cough, expectoration, hoarseness of voice, &c. If permitted to advance, the consequences are serious; loss of voice, increase of structural change in the air-passages, and impairment of the general health. Treatment consists in rest of the parts; application of the nitrate of silver, in the manner already described, both to the fauces and within the larynx; and alteratives internally, according to circumstances—arsenic, iodide of iron, Donovan's liquor, &c.

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[1] London Medical Gazette, January 12, 1833.

c. Chronic Œdema Glottidis.—This affection is more gradual and less marked than the acute form; but is not less dangerous; being liable to sudden and great exacerbation. The œdema is gradually formed, of more solid consistence, and more uniformly diffused. But from slight exposure to cold, error in diet, or other casualty, acute accession is very prone to supervene; speedily blocking up the passage, and causing the most distressing and dangerous dyspnœa; partly by acute swelling, partly by entanglement of viscid mucus, partly by spasmodic or otherwise disordered action of the muscles of the larynx. Sometimes, without any apparent source of aggravation, a fit of dyspnœa suddenly occurs, dependent, probably, on the last-mentioned cause, spasm. Such a patient is never secure. One moment he may be walking abroad, conversing, or otherwise enjoying life with tolerable comfort, the next he may be prostrate, livid, and struggling for existence. A fatal result, however, seldom follows the first of such seizures. Minor attacks usually precede the fatal event.

The duty of the practitioner is, by suitable treatment, to arrest the sluggish process, to undo the change of structure, and to restore tone to the enfeebled system; and, by every care, to provide against the application of such causes as are likely to induce aggravation. Should such aggravation occur, he must be on the alert. Medical treatment is continued, with redoubled care and anxiety; and the patient is closely watched. If the treatment prove unsatisfactory—fits of dyspnœa continuing to recur—tracheotomy is certainly to be performed. Thus only can the tenure of life be rendered at all secure in such cases; and then, too, the other remedial means may be expected to have a more salutary effect on the original disease—as in the case of simple thickening. After some time, the tube may be withdrawn, and the wound closed. However, prognosis as to discontinuance of the tube is not so favorable as in the acute form. Resolution may be slow and imperfect; the part may never wholly regain its normal state; perhaps respiration cannot be restored through the normal passages; and the tube, consequently, may require to be worn during the remainder of life.

d. Ulceration of the Larynx.—The larynx is liable to ulceration of different kinds—the result usually of a chronic inflammatory process: 1. *Simple ulceration* may occur as a direct result of chronic laryngitis, or of follicular disease; or the larynx may be implicated secondarily by extension of ulceration from the fauces—as is not unlikely to happen in patients who have the misfortune to labor under an aggravated form of mercurio-syphilis. The ulceration is very liable to be surrounded by œdematous swelling, which, by obstructing respiration, seriously complicates the case, and may demand both instant and energetic measures to save life. And such complication is especially apt to occur, if by exposure, or other cause, an inflammatory aggravation have supervened on the previously chronic form. Or the amount of œdema may be slight, respiration may never be seriously impeded, the ulcer may heal, and the normal calibre and function of the larynx may be almost wholly restored. Or, on cicatrization—long delayed—contraction and displacement of the parts are such as permanently to interfere most seriously with both voice and respiration.

Treatment consists in constitutional alteratives, suitable regimen, careful protection from all sources of aggravation, patient continuance of moderate counter-irritation, and regulated use of nitrate of silver to the affected part; and thus we hope to effect cicatrization, ere dangerous loss of substance has occurred—to effect, in short, something like actual resolution. If œdema supervene, and life be threatened by paroxysmal dyspnœa, tracheotomy is imperatively demanded, and must be performed. At this juncture, it is indispensable to the preservation of life. But it comes to be a question, whether its earlier employment may not be expedient; not to save life, directly, but to save structure; by placing the larynx at rest, and so facilitating the action of remedial means—accelerating cicatrization while ulceration is yet both limited and superficial, and thus preserving unimpaired the important function of the organ. I would incline to the opinion that it is expedient to have recourse to tracheotomy, and temporary use of the tube, in those cases of simple [illegible] of the larynx which threaten to resist ordinary remedial means, [illegible] which, by loss of substance, endanger the function of the part; opera[illegible]ing before life has been threatened by intercurrent œdema; when t[illegible] is soreness on pressure of the thyroid cartilage; when pain is felt ac[illegible] on the box of the larynx being rubbed laterally across the spine; w[illegible] there is a sensation of rawness and soreness in the part complained [illegible] by the patient; when there is decided and peculiar fœtor in the br[illegible] with pain and difficulty in swallowing, cough, and purulent sputa—[illegible]sionally streaked with blood; and when these symptoms persist [illegible]dued. By the operation, the diseased part is put at rest; counter[illegible]tation and alterative treatment will have a much more powerful [illegible] salutary influence; and besides, an additional opportunity is afford[illegible] applying remedial means directly to the ulcerated surface. From [illegible] tracheal wound, the nitrate of silver may be applied freely to th[illegible]eased surface, more readily and accurately than through the g[illegible] And thus, healing may be obtained at an earlier period than othe[illegible] could have been possible; the part recovers without loss of sub[illegible] and, after a time, the tube may be finally withdrawn, leaving the [illegible] complete. When, however, tracheotomy has been performed at [illegible]vanced period of the case, on account of emergency caused by œ[illegible] the tube's discontinuance is very uncertain; a falling in of the [illegible] of the larynx is too probable, as the result of cicatrization; and in[illegible]sequence, permanency of the artificial opening may be rendered i[illegible]pensable.

2. *Tubercular Ulceration* not unfrequently attacks the wind[illegible]

ting the true *Phthisis Laryngea.* There is first submucous or
deposit of tubercle, which softens, disintegrates, and opens up
nbrane in patchy chronic ulceration. The scrofulous cachexy
; and too frequently, also, phthisis pulmonalis is coexistent.
gh by no means likely to make a satisfactory impression on such
itutional malady, still the ordinary treatment is to be patiently
d. Tracheotomy is certainly not advisable, as a means towards
ation and cure; but it may be had recourse to as a mere palliative
ans of protracting existence—when, by the occurrence of œdema,
hreatened from suffocation.

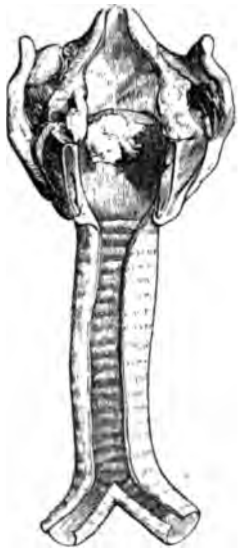
diseased state of the cartilage is not unfrequent, in broken down
o-syphilitic habits; associated with chronic abscess and ulceration.
nced age, the cartilages become ossified, and may necrose. But
ich we now allude to is a different affection; bearing the same
to senile degeneration of cartilage, as atheromatous deposit in
rial tissue, favorable to aneurism, does to the senile calcareous
n of arteries. The cartilage is thickened, indurated, changed in
l partially ossified; portions die; suppuration takes place around;
ter bursts into the windpipe, and is expectorated; a ragged ulce-
perture remains; the diseased portion of cartilage loosens, pro-
and, having been wholly detached, is expectorated; the cavity
eld it may then contract and close, along with the ulcerated aper-
rough which it made its escape; or additional suppuration takes
esh portions become necrosed, and the disease is both aggravated
tracted. In the most favorable point of view, prognosis is un-
tory; for cicatrization cannot take place, without entailing such
tion and change of the canal as must seriously and permanently
e with respiration. Sometimes a dead portion of ossified cartilage,
been detached, falls downwards; and becoming impacted in a bron-
mification, leads to a fatal issue, either suddenly by asphyxia, or
motely through pulmonary disease.

tment is as in ordinary ulceration of this part, with especial
n to the constitutional vice. And when an emergency, perilling
s occur, by intercurrent œdema of the larynx, tracheotomy is
y advisable; not with the hope of thorough cure, but in order to
nmediate danger, and perhaps to accelerate cicatrization. If
tinue, the tube must be permanently worn; for, under the most
le circumstances, it is not to be expected, in this affection, that
calibre and function can be regained.

heal Fistula is apt to result from the preceding affection. The
connected with the necrosed portion of cartilage may discharge
ternally, as well as into the windpipe, and a fistulous aperture
nlikely to remain. This may be brought to heal, by the occa-
se, at long intervals, of heated wire (*Principles*, 4th Am. Ed.
But let no attempt at closure be made, until we are certain
necrosed portion has been fairly extruded, and that no fresh
rum is in progress there; otherwise, by confining the matter,
ausing swelling and obstruction, serious consequences to respi-
nay ensue.

Warts of the Larynx.

Fig. 128.



Warts in the larynx: growing in the situation of the vocal chords.

Warty excrescences have sometimes been found growing from the lining membrane of the larynx, at its upper part; and solid enlargements of structure, pendulous, pyriform, and of the nature of polypus, have also occurred, though still more rarely. They necessarily impede respiration; and, by leading to an inflammatory accession, with its attendant œdema, they may bring life into sudden and imminent jeopardy. The voice is hoarse, and ultimately lost; a hard cough, like that of croup, is troublesome; and during deglutition and expectoration, the sensation is felt of a foreign body in the larynx; but the most characteristic evidences are the expulsion of small portions of the tumor by coughing, and the seeing and feeling its upper part by careful and deep exploration of the fauces. When an emergency by dyspnœa occurs, tracheotomy is plainly required. Through the wound—made more free than usual—the growth is removed, by evulsion or knife. And for some days, at least, the use of the tracheotomy tube will be expedient, lest inflammatory swelling occur at the injured part.[1]

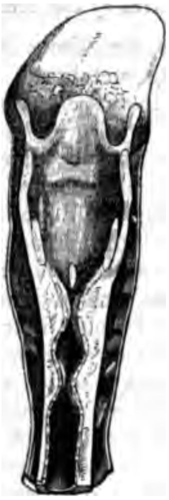
Stricture of the Windpipe.

Contraction of this tube is liable to occur, at various points, and from various causes; by contraction of the wound after cut throat; by contraction after cicatrization of ulcers; by change of structure following on chronic laryngitis, independent of ulceration; by necrosis and discharge of portions of cartilage, and consequent narrowing of the passage after closure of the ulcerated cavities. It is doubtful whether our art may be able to restore the normal calibre and function in such cases, by dilatation, as in similar affections of other mucous canals. The experiment has been made;[2] but the present voice of experience is as yet scarcely in favor of the measure—except in the case of contraction after wound. Life may often be protracted, however, and suffering alleviated, by continued use of the tracheotomy tube, of full size; and by unremitting attention to keep both tube and trachea free from accumulation of viscid mucus. The latter indication may become of easy fulfilment, in consequence of the tracheal and bronchial membrane losing much of its sensibility—becoming almost cutaneous in this respect, and not resenting a tolerably free use of probe, feather, sponge, or other means employed for clearing the passage.

[1] *Vide* Monthly Journal, Dec. 1846, p. 458.

[2] Liston, Elements, p. 453.

Fig. 129.



Double stricture of the trachea; the canal decidedly dilated on the lower aspect of the second contraction. "The patient had worn a small silver tube in an opening in his windpipe for many years. It was originally introduced on account of long-continued disease of the larynx, with dreadful suffering and constant sense of impending suffocation. He could not be made to dispense with the tube entirely, as he felt immediately on the wound closing a threatening of return of his painful and dangerous symptoms. A small one was substituted for that at first used. He led a very irregular life, used a vast quantity of opium, and no small amount of spirituous liquors. He used to be out in the open air occasionally all night, and suffered repeatedly under attacks of bronchitis. He was under treatment again and again in the hospital, on account of rheumatic affection and deranged digestive organs. He used occasionally to present himself, complaining of difficult breathing, and stating that his silver tube was too short. He could articulate tolerably well when he stopped with his finger the orifice of the silver tube; at all times a part of the respired air passing through the natural channel. Latterly, he used to suffer from threatening of suffocation, and he used to relieve himself of the cause of this, viz., the inspissated and ropy mucus which got entangled in the trachea, then not suspected to be in a diseased state, by pushing through the opening in his neck, and into the bronchi, long turkeys' feathers; of these he carried a good store, and some are now in my possession. This feat he performed without causing the slightest excitement or coughing. Ultimately, and about twelve years after the operation had been performed, he died, principally from diseased viscera."—Liston. *Vide* Elements of Surgery, p. 454.

Formation of Matter near the Larynx.

Diffuse infiltration of purulent matter may take place, deeply, in the neck; and the consequent swelling and tension may seriously impede respiration, by encroaching on the canal of the windpipe. The proper remedy is free incision of the infiltrated part, whereby both cause and effect are at once removed. Should this fail, or should the symptoms prove obscure so as not to warrant or even indicate incision, tracheotomy is certainly advisable.

Circumscribed abscess may form in the vicinity of the larynx. And the rules of practice are the same; an early evacuating incision, if possible; otherwise, tracheotomy.

Bronchotomy, then, *is available*, in the following cases:—1. In the case of *foreign bodies* lodged in, or otherwise obstructing, the air-passages. Extrusion, independently of this operation, may be expected to be the exception to the general rule. 2. *In suspended animation;* when we cannot otherwise effect, with certainty, artificial inflation of the lungs—as will rarely be the case. 3. In *spasm* of the glottis. Threatened asphyxia from external injury may perhaps depend on this cause—perhaps on a precisely opposite condition; in either case, the operation is demanded to save life. And there is a like necessity, in the spasmodic occlusion of the glottis, which attends poisoning by carbonic acid. In laryngismus stridulus, we withhold the operation if possible, and trust to general treatment; yet we are aware that urgent circumstances may arise to demand the tracheal wound, at least with the hope of palliation, and perhaps with the effect of affording time for the effectual working of other remedies. In certain cases of thoracic aneurism, too, when laryngeal distress is occasioned by irritation of the recurrent nerve, and threatens immediate death, tracheotomy is advisable—in some few cases, it may be, with more than the hope of mere palliation. 4. In *œdema glottidis*, chronic and acute, there is no safety but by operation, so soon as the symptoms have become at all urgent. And, in the acute cases, there is good hope of speedy discontinuance of the tube, closure of the artificial aperture, and complete restoration of normal respiration. 5. In *laryngitis fibrinosa*, the operation is as warrantable as in urgent œdema, when the disease is limited to the larynx. But in most cases of true croup, in which the whole windpipe with its ramifications is involved, operation may rather be regarded as an exception to the general rule of non-interference; in the early stage, it is inexpedient, while mechanical obstruction to respiration is not yet threatened; in the more advanced period, it is likely to prove ineffectual. 6. In *purulent laryngitis*, there may be the same necessity for operation, and the same prospect of a good result, as in acute œdema. 7. In *chronic laryngitis* with thickening, the supervention of œdema, through inflammatory accession, may render operation indispensable to the preservation of life. 8. In *simple ulceration*, the same event may occur as that just mentioned in connection with mere thickening of the membrane. Or, independently of such an accidental crisis, operation may be deemed expedient, to assist the action of other remedial means, and by effecting early cicatrization to save structure and function. 9. In *ulceration, with disease of cartilage*, operation is likely to be required to save life from immediate danger by threatened asphyxia; but with little or no prospect of discontinuance of the tube's use. 10. In *phthisis laryngea*, it may be similarly demanded for a temporary object; scarcely with a hope of contributing to cure; but rather as a means of protraction and palliation. 11. In *pressure on the windpipe*, caused by the formation of tumor or abscess, or by impaction of food in the œsophagus or pharynx—operation may be necessary, if the obstruction to respiration cannot be otherwise relieved, namely, by removal of the cause; by evacuation of the matter, extirpation or diminution of the tumor, or extrusion of the impacted substance. 12. In *cut throat*, tracheotomy is not unfrequently demanded to save life from impending asphyxia; and it may be expedient, at an early period of the case, to avert all such hazard, and to favor as well as permit immediate and entire closure of the wound. 13. In *glossitis*, in *tonsillitis*, and in extreme cases of *laryngitis*, it is required, when swelling is so great, rapid, and unconollable, as otherwise to render fatal asphyxia all but inevitable. 14. *carotid aneurism* of large size—when, by circumstances, we are preuded from speedy recourse to deligation of the artery—life may be ddenly brought into peril, by supervention of the diffuse form on the rcumscribed (*Principles*, 4th Am. Ed. p. 492), and consequent comression of the windpipe. Bronchotomy then is essential; and the tube ill require to be worn, until by deligation of the artery we have effected ich diminution in the bulk of the tumor as altogether to free the respitory canal. 15. *Thoracic aneurisms*, by compressing and narrowing e air-passages, may simulate the results of inflammatory disease in e larynx; and, in such circumstances, little good can be expected from ronchotomy. In those cases, however, in which the tumor is small, nd causes dangerous paroxysms of dyspnœa by spasm of the larynx rising from irritation of the recurrent nerve, the operation, as already tated, is certainly expedient.

In the great majority of cases, tracheotomy is preferable to laryngotomy, for obvious reasons.

The passing of tubes into the windpipe, by the nose or mouth, has een proposed as a means of superseding bronchotomy. But modern xperience limits their use to cases of suspended animation, unconnected ith laryngeal or tracheal disease; and even then, their superiority may ome to be a matter of question and doubt.

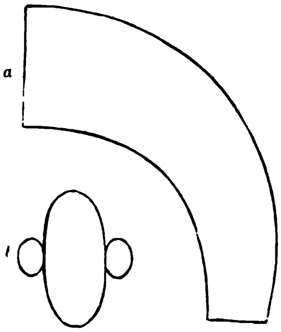
Laryngotomy.

The performance of this operation having been determined on, the atient is seated on a chair, with the head thrown back and steadied. longitudinal incision is made over the box of the larynx, in the mesial pace; by dissection, the crico-thyroid membrane is exposed; and through is an opening is then made by the knife—as free as the cartilaginous oundaries of the space will allow. There will seldom be any trouble by emorrhage.

Tracheotomy.

Excepting the case of artificial respiration on account of asphyxia nconnected with laryngeal disease, the case of a foreign body impacted the rima, and the case of a loose foreign body of small size within the indpipe, tracheotomy is certainly preferable to laryngotomy. The atient having been placed as for the latter operation, an incision is ade in the mesial line of the lower part of the neck, from an inch and half to two inches in length, the upper portion terminating a little bove the cricoid cartilage. Skin, fat, and fascia having been divided, e commissure of the sterno-hyoid muscles is exposed; and this is carelly separated by the handle of the knife. The tracheal rings are ade bare; detachment of the areolar investment being effected by ither the point or handle of the knife, according to circumstances. hen the patient, if adult and conscious, is directed to swallow saliva. hile the windpipe is rendered tense and elongated in the act of deglutition, the scalpel is made to penetrate at the lower part of the wound, with its back to the sternum; and, by a sawing movement of the instrument upwards, the necessary extent of tracheal wound is completed; the isthmus of the thyroid gland being pushed out of harm's way, by the finger—upwards. If operation have been undertaken on account of the lodgment of a foreign body, no tube is necessary. The wound having been made, the foreign substance, if loose, will be expelled at once; if not, it is to be sought for by probe and forceps, as formerly stated. In the case of disease, it is our object to establish a constant and sufficient aperture for respiration, at the site of the wound; accordingly a curved silver canula is introduced; and this is retained by tapes passing from a ring on each side of the canula, to be secured behind the neck. The canula is of sufficient size to atone, completely, for the temporarily occluded rima; varying, consequently, according to age; and generally, of not much less diameter than the trachea which receives it. Yet it should not be so large as to press harshly on the lining membrane of the passage, lest ulceration be induced. The wound should be of size sufficient to receive the canula, without force, and yet not too freely; the cut margins should be compressed by the canula, internal escape of blood being so prevented; and this object is further contributed to by the conical form of the instrument. To facilitate introduction, the canula may be provided with a plug, the bulbous end projecting—as in the vaginal speculum; an idea for which we are indebted to Dr. W. T. Gairdner. The patient is laid on his side, so as to render the wound dependent, and favorable to the outward escape of blood and mucus. After a time, when the conical form of tube is no longer an advantage, on account of hemorrhage, an instrument of uniform calibre may be substituted, as more suitable for respiration. And in cases of old standing—more especially those in which the tube is permanently retained—a double canula may be used; one portion being removed from time to time, for the purpose of being cleaned, while the other remains keeping the canal constantly free. To the orifice of such an instrument, too, it is well to attach a valve, which opening to the full in inspiration leaves the whole space free, but shutting in expiration forms a smaller aperture suitable for expectoration.

Fig. 130.



Ordinary canula; *a*, in profile; *b*, transverse section of orifice.

The circumstance of the canula's introduction being itself an efficient hemostatic means, materially facilitates performance of the operation.[1] It is not necessary to wait for entire cessation of bleeding before opening the windpipe; no valuable time need be lost in stemming oozing; main jets of blood, if any, having been secured, the tracheal wound is at once made, and the tube as speedily introduced. At first the pre-

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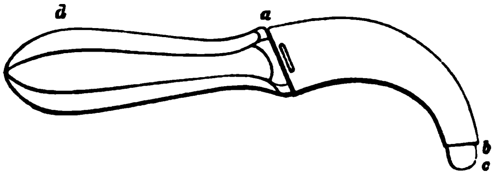
[1] The tube is a hemostatic, not only by its pressure on the edges of the wound; but also, and very importantly, by freeing the venous return in the neck, which during dyspnœa is necessarily much retarded.

ce of the foreign body, and of the small quantity of blood which has
essarily entered along with it, is much resented; a violent fit of
smodic cough, threatening suffocation, ensues; but the blood having
n thrown back, through the tube, this fit of irritation passes off, and
parativeIy calm respiration is speedily established through the arti-
al opening. For many hours—but more especially during the first
—the patient must be carefully watched, lest the tube become ob-
icted by mucus; and this is from time to time to be cleared away,
a probe, armed with lint or sponge, or by a feather; or the double
ula may be used from the first, admitting of one portion remaining
the wound, while the other is withdrawn and cleaned occasionally.
ch attention is particularly necessary, as formerly stated, if the pa-

Fig. 131.



nula, as recommended by Dr. Gairdner. From *a* to *b* the canula. *c*. The end of the plug, projected. *d*. handle of the plug. The plug is of course withdrawn, so soon as the canula has entered the windpipe.

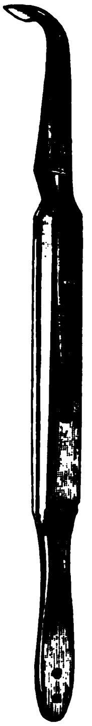
it have fallen asleep after the operation. When expectoration is
empted, it is necessary to diminish the aperture of the ordinary tube
y considerably, by temporary application of the finger, so that the
ired air may be expelled forcibly. At first, this narrowing is made
the surgeon; but soon the patient becomes an adept in the simple
nipulation. Should he grow too weak to expectorate, it is well to
empt extraction of the mucus by suction; by the adaptation of a
inge, or by the mouth of an assistant—if possible.

As already seen, in some cases the tube may be withdrawn, and the
und permanently closed, after a few days or weeks; in other cases,
mal respiration can never be restored, and the tube must be worn
ing the remainder of life. And in these latter, it is truly surprising
r little inconvenience is sustained; respiration becomes easy and
nt, and even the voice may be regained, so far as to admit of the
ient fulfilling the ordinary duties and customs of society.

The prominent danger of the operation is by hemorrhage. During
incisions this is to be guarded against by caution in the placing and
king of them; more especially avoiding the large veins which are
en to be found in the lower and front part of the neck; and if any
ay vessel be encountered, it should be held carefully out of the way
an assistant. Arterial branches, which spring, are to be secured
ligature; to venous orifices temporary pressure may be applied. On
ount of mere venous bleeding, however, no delay should take place;
re especially when the operation is being performed on account of
spnœa; for the most likely means of freeing respiration, favoring
ous return, and obtaining a comparatively quiescent and empty state
the veins implicated, is by lodging the tube in the tracheal wound.

It has been often proposed, with a view to render the operation both more simple and safe, to perforate the trachea by means of a trocar and canula; discarding the knife. Ingenious instruments for this purpose have been invented by Dr. Marshall Hall, and others. Most practical surgeons, however, seem still to prefer the method by incision.

Fig. 132.



[Instrument of M. Garin for opening the Trachea. (From Fergusson.)]

In all cases, it is obviously of much importance to keep the patient in an equable and genial temperature, to cover the wound with some cloth of loose texture, and to take every other means which may suggest itself, as likely to ward off the inflammatory accession by the stimulus of cold air directly applied to the membrane—as in the case of cut throat.

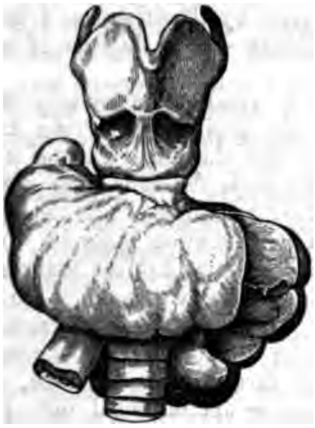
In the child, operation may be rendered extremely difficult; by the restlessness of the patient, the crying and struggling which engorge the veins, the small size of the trachea, the limited space of the neck, the number of veins likely to be encountered, and the intolerance of loss of blood on the part of the system. The dissection must be conducted with unusual caution; and it is well, after exposure of the trachea, to fix it by means of a sharp hook, so as at once to facilitate and render more safe the performance of the tracheal wound. So soon as this has been effected, the child should be instantly turned upon its face, so as to prevent, as far as possible, escape of blood into the trachea. On cessation of the hemorrhage, the ordinary position may be resumed, should the circumstances of the case render this expedient.

In most cases, anæsthesia will be considered inexpedient, except during exploration by forceps after the operation has been performed, on account of the lodgment of a foreign body. [Dr. Gross is decidedly in favor of anæsthesia in this operation, as it has been found in several instances to afford material aid to the operator, while it did not appear to do any immediate or subsequent harm to the patient. See on this whole subject, Dr. Gross's excellent work on Foreign Bodies in the Air-Passages.]

Bronchocele, or Goitre.

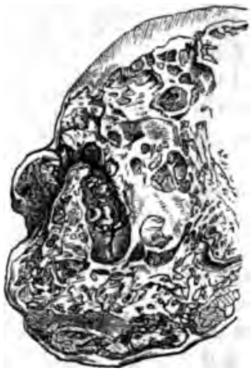
The term denotes swelling of the thyroid gland; and this may be of various kinds. 1. *Mere hypertrophy* is common; the enlargement being essentially chronic and very gradual; and ultimately making a transition into the state of simple tumor (*Principles*, 4th Am. Ed. pp. 257, 271). The whole gland may be equally involved; or the isthmus alone may enlarge, while the lobes remain of a normal character; more frequently one or other lobe is the seat of the partial affection; and sometimes both lobes are involved, while the central portion remains free. And, indeed, the same remarks, as to the partial or general character of the swelling, apply to the other varieties of the affection. 2. The swelling may be of a *cystic* nature, the stroma being analogous to the structure of the simple tumor, the cysts either numerous and small, or few and capacious, delicate, and filled with a glairy fluid. This probably is the most frequent form of the disease. 3. The simple stroma may contain a greater or less amount of *calcareous* matter, giving much density to the tumor, which is seldom then of large size. 4. The tumor may be *malignant*. Carcinoma is rare. Cephaloma, which is not so, follows its ordinary course, and presents its usual characters.

Fig. 133.



[Bronchocele, from a specimen in King's College Collection. The œsophagus pushed to the right by the tumor. (From Druitt.)]

Fig. 134.



[Drawing from a preparation in the Middlesex Hospital. The cystoid appearance of section. (From Druitt.)]

Bronchocele is, in certain localities, an endemic disorder. In the Tyrol, and in the valley of the Rhone, it is especially so; and there almost invariably associated with the sad condition to which the term Cretinism has been applied. In this country, the disease is comparatively rare, and happily such an unfortunate combination but seldom exists. In Derbyshire, and some other counties, both in Scotland and England, however, it merits the appellation of endemic. The majority of the patients are female; and the ordinary period of invasion is about the time of puberty. The most prominent symptom is inconvenience, with deformity, occasioned by the bulky swelling. Growth is gradual and painless—unless in the malignant variety. The indications by touch vary according to the nature of the interior. As the tumor enlarges, the head becomes disordered, in consequence of venous return thence being interfered with; and respiration also is more or less seriously impeded, by pressure on the windpipe—especially when the central portion of the gland is affected. Partial enlargement—affecting but one lobe—is apt to simulate carotid aneurism, receiving a decided impulse from the adjacent vessel; and careful manipulation is necessary to arrive at a correct diagnosis. In addition to the ordinary diagnostics (*Principles*, 4th Am. Ed. p. 493), it is to be borne in mind that, on deglutition being performed, a bronchocele will be found to move upwards with the larynx, while an aneurism remains unaffected.

The causes of the disease are scarcely yet evolved from obscurity. Where endemic, it seems certainly connected with habitual use of unwholesome water as an article of food, and habitual exposure to a humid atmosphere; and this circumstance necessarily possesses an important bearing on the question of cure.

Treatment.—In reference to treatment, the examples of this disease may be conveniently divided into three classes: those which are merely deformities, unseemly, and somewhat troublesome by their bulk; those which bring life into peril, directly or indirectly, by interference with the brain and the air-passages; and those which, by reason of their malignant character, as tumors, sooner or later are fatal. These last—fortunately rare—are generally hopeless throughout their entire course. But for the second class, the most determined remedial means may be with all propriety resorted to. For the first, heroics are not warrantable. And, fortunately, the majority of cases, in this country, demand only the milder form of treatment. Iodine has long been regarded as the most powerful remedy; and justly. Internally, it is administered in the form of iodide of potassium—or combined, as with iron. Externally, it is applied in the form of solution, painted frequently on the swelling—or ointment, or liniment, rubbed in—moderate leeching having been premised, in those cases in which continuance of nutritive excitement may seem to render such a measure expedient; our object being to arrest growth, as well as to discuss bulk already attained. At the same time, habitual exposure to a dry and otherwise salubrious atmosphere, with habitual use of sound water—chalybeate if possible—are curative indications by no means to be neglected. And such treatment will be carefully maintained, so as to prevent a tumor, originally of the first class, from becoming of the second, and seriously perilling life by interfering with both breathing and circulation.

Central tumors, pressing on the windpipe, may be removed by operation, when of no great size; partly by excision, partly by deligation. By the scalpel the integuments are freely divided, and turned aside; the tumor is laterally separated from its connections, care being taken to secure each arterial orifice by ligature, so soon as divided, and each venous orifice—as far as possible—by pressure of the fingers of an assistant; and having proceeded as far with the knife, in the work of detachment, as prudence will allow, the remainder of the connections are to be included tightly in ligature. A strong needle is passed beneath the base of the tumor, the double ligature is divided, and each portion is tied separately, so as to strangulate the mass (*Principles*, 4th Am. Ed. p. 525, Fig. 199). Tumors of the isthmus have been thus removed successfully; and it is probable that the same principle of operation may sometimes be extended to other swellings not limited to that part of the gland.

Large, solid bronchoceles, involving the whole gland, and of greatest bulk laterally, are not amenable to such radical cure. Their size, site, and attachments preclude the use of ligature; and attempted removal by the knife could scarcely fail to prove fatal by hemorrhage. Of late, however, an ingenious mode of operation has been devised by M. Porta; founded on observing that the large arteries which supply the thyroid land do not enter the interior of it, but break up into numerous small ranches at the circumference, and that consequently hemorrhage need e dreaded only when the exterior part of the tumor is interfered with. Besides, the majority of simple bronchoceles he found to consist of umerous cellular or cystic developments, which push aside the proper exture of the gland, reducing that to the condition of a simple envelope, on dividing which the new products are exposed, or may be extracted without difficulty, injuring only small vessels, and leaving behind a fleshy ac which collapses, leaving no trace of the tumor. Accordingly, the peration is performed thus: the integuments of the neck, and usually lso the omo-hyoid muscle, are divided by incision; the tumor is cut into, voiding the trunks of the thyroid arteries; if any of these spring, they re tied or twisted; the exposed cysts are removed by forceps, or the andle of the knife; more solid structure, if it exist, is broken down and xtruded by the same means; and bleeding having been arrested, the wound is closed.[1]

In hopeless cases life may be protracted, and great relief afforded, by ubcutaneous section of one or both sterno-mastoid muscles, so as to diminish tension, favor outward growth, and relieve the trachea and ugular from compression. In some cases also, protraction and palliaion may be obtained by tracheotomy; when the circumstances of the ase are such as to render the performance of that operation practicable.

For the purely cystic bronchocele, simpler means may supersede the more formidable operation of M. Porta. Iodine may be injected as in hydrocele (and to such affections some apply the term hydrocele of the neck), or a seton may be used. The cyst having been punctured, and ts contents evacuated, a few threads of silk may be passed through the substance of the swelling, and retained. It is probable that the inflammatory result will lead to obliteration of the cystic formation; but much care is necessary in watching the process, lest it prove excessive, and threaten asphyxia through sudden and great enlargement of the swelling. For the solid tumors, the seton is not well adapted; it not only fails to discuss, but is also exceedingly prone to accelerate growth.

Tumors over the Thyroid Gland.

Not unfrequently cystic formations are found, not in the substance of the thyroid gland, but between this and the integument. If of small size and circumscribed, they may be dissected out. Those which are large may be treated by seton or injection.

Enlargement of the Thyro-hyoid Bursa.

Like other bursæ, that which is situated between the hyoid bone and thyroid cartilage is liable to enlargement, chronic or acute; causing more or less swelling, with pain, and obstruction to the movements of the neck. The acute form is met by repeated leeching and fomentation; the chronic is appropriately treated by the local application of iodine in solution, or by other discutients.

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[1] Brit. and For. Med. Chir. Rev., Jan. 1851, p. 106.

Hernia Bronchalis.

A rare affection, so called, has been observed in those who habitually strain the throat in loud and sustained calling. A fold of the lining membrane is protruded outwards between two tracheal cartilages; and thus a greater or less tumor, soft and compressible, is formed, according to the extent of protrusion. The only remedial means advisable are such outward applications as are likely, by affording external support, to oppose further enlargement. And the exciting cause—straining of the throat—is, of course, to be discontinued.

Disease of the Cervical Vertebræ.

The chain of cervical vertebræ, like other bones with their articulating surfaces is liable to disease of various kinds:—1. The bodies of the vertebræ may be interstitially absorbed. Then a greater or less degree of curvature is likely to ensue; the head usually bending forwards, with deviation to one or other side; and, not unfrequently, there is thickening of the soft parts exteriorly, in consequence of a chronic inflammatory process slowly advancing there. 2. Or the bodies of the vertebræ are affected by the results of true inflammation. At first there are thickening, hardness, and tenderness on pressure; indicating the ostitic and periostitic state. Afterwards matter forms, the bones are eroded by ulceration, and portions may be detached in the form of sequestra. There are pain, swelling, tenderness on pressure, and the other usual signs of an advancing process of disorganization. More or less deformity, by curvature, necessarily ensues; partly from change in the bones, partly from a wasted and paralyzed state of the extensor muscles. As can be readily understood, deglutition is early and much interfered with; and by encroachment on, and involvement of, the cervical nerves, serious results are likely to occur, as regards respiration. The functions of the superior extremities, too, may be perilled, by affection of the brachial plexus. The disease is generally connected, in the patient's narrative, with external injury; and the persons most likely to be affected are the young and strumous. 3. Or the disease may originate in the articulating textures; ultimately inducing similarly destructive results. 4. There is good reason to believe that, not unfrequently, such affections follow in regular succession; the disease commencing in interstitial absorption of the bones, advancing from absorption to true inflammation, and ultimately disorganizing both bone and joint.

The obvious treatment of such disease, is to endeavor to arrest its course by leeching and counter-irritation—the latter of the graver sort (moxa, or actual cautery), and patiently continued; to exhibit iodide of potassium internally, more especially when taint of the system is suspected; to keep the part at rest; and, in the advanced cases, to relieve the affected bones from the weight of the head, as much as possible, by mechanical means. A firm iron rod, fixed in a circular girth on the trunk, passes upwards, excurvating to receive the posterior part of the head, and terminating over the forehead; and by a bandage or strap attached to the extremity of the rod, and passed under the chin, the required support is afforded. All suddenness of motion in the neck is especially to be avoided; but indeed, in most cases, the patient has an instinctive dread of such risk, and carefully guards against it; turning the head slowly, and with the chin supported on the hand. In the case of disease affecting the atlas and dentata, such precaution is particularly necessary; lest by sudden rupture of the ligamentous apparatus, displacement should occur, causing fatal compression of the medulla. Should matter form in considerable quantity, and seek to approach the surface, at the lateral or posterior part of the neck, a free and early incision is to be made, for evacuation. In advanced cases, the only hope of cure is by anchylosis.

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CHAPTER XIX.

AFFECTIONS OF THE ARTERIES OF THE NECK AND SUPERIOR EXTREMITY.

Deligation of the Carotid.

The *common carotid artery* may require deligation on account of aneurism, hemorrhage by ulcer or wound, or erectile tumor in the orbit. Carotid aneurism is usually situated at the upper part of the vessel, near the angle of the jaw; forming a tumor there of the ordinary characters, which, should it become diffuse, might seriously interfere with respiration. It possesses a peculiarity of being ill-surrounded by repressing tissues; it grows chiefly towards the pharynx, and may imperfectly consolidate after operation (*Principles*, 4th Am. Ed. p. 504). Sometimes —but fortunately comparatively seldom—the disease affects the origin of the artery; and then its interference with respiration is more early and serious. From sudden increase of the tumor—by diffusion or otherwise—immediate performance of tracheotomy may be demanded to save from urgent threatening of asphyxia.

The artery may be secured at one of two points; above or below where it is crossed by the omo-hyoid muscle. The former situation is the more easy of access, and is to be preferred when circumstances are favorable; but in cases of aneurism, the tumor will generally be found to have encroached too far on the upper triangular space.

The superior operation is performed thus:—The patient having been placed recumbent, with the head thrown back and turned slightly to the opposite side, an incision is made through the integuments, platysma myoides, and superficial fascia, extending in the direction of the inner border of the sterno-mastoid muscle, from near the angle of the jaw to the level of the cricoid cartilage. The deep fascia is carefully divided, with the use of forceps; cross veins are looked for, and avoided; the margins of the wound are held asunder by means of bent copper spatulæ; and it may be useful to relax the parts somewhat, by changing the position of the head. The descendens noni is pushed aside; the common sheath of the vessels having been pinched up by forceps, is opened to the requisite extent; and cautious isolation of the artery is proceeded with, so as to afford clear space for passage of the aneurism-needle—and no more. The needle is passed from the outside; the jugular vein being repressed, if necessary; and thus risk is avoided of injuring the vein, or including the par vagum.[1] Before securing the knot, especial care ould be taken to ascertain that nothing but the arterial coats is in- uded.

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[1] From inattention to this rule, at an early period of my professional life, I had the misfortune to include the par vagum in the noose of the ligature. But it is some consolation to

The inferior operation is more generally suitable in the case of aneu- sm, as already explained. The patient having been placed as before, n incision of about three inches in length, parallel to the inner border f the sterno-mastoid, is begun a little above the level of the cricoid artilage. The inner border of the muscle, having been exposed, is autiously turned outwards; while the sterno-hyoid and sterno-thyroid uscles are displaced in the opposite direction. The deep fascia is ivided below the crossing of the omo-hyoid muscle; and, the sheath aving been opened, the operation is completed as before. The descen- ens noni, in the former case in front of the sheath, is here found inclin- g to the tracheal side of the artery. On the left side, the jugular ein is very apt to prove troublesome by overlapping; on the right side, recedes from the carotid, to meet the subclavian vein.

After the operation, congestion of the lungs, with its baneful con- equences, must be guarded against by use of the lancet. And, in the ase of aneurism at the angle of the jaw, external pressure is to be made n the tumor, so as to atone for the deficiency of repressive textures, rmerly alluded to. It is well, also, to keep the neck bent, so as to lax the artery.

The artery at its inferior part has been secured by a transverse wound; atting the sterno-mastoid across, upon a director, and then opening the heath in the ordinary way.[1]

In the case of aneurism at the root of the common carotid, deligation f the artery at its upper part may be practised, with a reasonable hope f cure. For, as formerly stated (*Principles*, 4th Am. Ed. p. 505), the ommon carotid is favorably adapted for Brasdor's operation.

Deligation of the external carotid, and its branches, is required only the case of hemorrhage; and chiefly on account of wound. No definite les need be given as to the operative procedure; this must be guided y the general principles formerly inculcated, and modified by the par- cular circumstances of the case.

Deligation of the Arteria Anonyma is an operation now considered opeless; and, in all probability, will never be repeated by any judi- ious surgeon; circumstances seeming to be insuperably hostile to satis- ctory occlusion of the artery at the deligated point.

Deligation of the Subclavian.

This artery requires ligature, on account of axillary aneurism. emorrhage by wound or ulcer is likely to call for the operation but arely.

Surgically, the vessel is conveniently divided into three portions: in- rnal, from its origin to the inner border of the scaleni; middle, where verlaid by the anterior scalenus; external, between the outer border of

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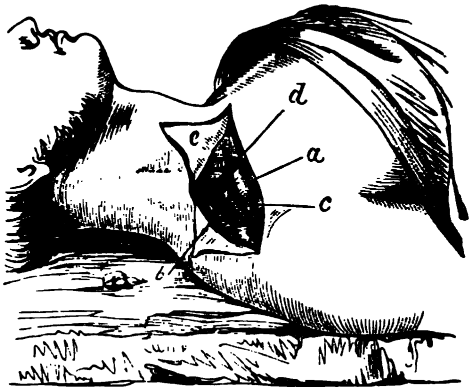
ow that the accident was, in all probability, unconnected with the fatal issue of the case. record the circumstance here; that it may be of use, as a beacon, to deter and warn others m similar inattention and mishap.

[1] Hargrave, Dublin Quarterly Journal, Aug. 1849.

this muscle and the passage over the first rib. On the right side, it is possible to secure the artery at any of these parts of its course; on the left, the two last only are practicable, the internal third being not only very deeply seated, but in close contact with most important parts which can scarcely fail to sustain serious injury in the attempt. On either side, the middle third is not desirable; there being risk of serious injury to the phrenic nerve, as well as a probability of unsatisfactory occlusion on account of the near propinquity of large collateral branches at the deligated point. The external third is preferred. But if, in performing the ordinary operation on this part of the vessel, the coats appear unsound, we are fully warranted in cautiously turning aside the scalenus muscle, and seeking upwards for a more healthy portion.

Fig. 135.



Plan of the relative position of the subclavian artery, in its outer third; a, subclavian vein: b, brachial plexus of nerves; c, subclavian artery; d, scalenus muscle; e, flap reflected.

Deligation of the external third is accomplished thus:—The patient having been placed recumbent, on rather a high table, and the elevated shoulder having been forcibly depressed as much as possible, an incision is made over the clavicle, through the skin and platysma myoides; extending from the anterior border of the trapezius, to a little beyond the posterior border of the sterno-mastoid. And it is well to pull the skin downwards before using the knife, so that, on resilience, the wound may be more directly correspondent with the course of the vessel. A minor incision is made to fall into the first, passing along the posterior border of the sterno-mastoid; and the flap thus indicated is slightly reflected. The cervical fascia is divided; the external jugular vein is looked for, and turned aside; the posterior belly of the omo-hyoid may be disclosed; and then we know that in the triangular space between that and the clavicle, is contained the object of our search. The outer edge of the scalenus muscle is sought for; at the same time a part of the brachial plexus is brought into view; and now the field of search is further limited; the artery will be found by tracing the border of the muscle downwards, on a lower and more anterior plane than the portion of the plexus exposed. Placing our finger on the tubercle of the first rib, the artery is felt pulsating between; and the knife is guided accordingly. The vessel having been reached, is cautiously isolated to the requisite extent; and the needle is passed from the clavicular aspect, so as to avoid injury of the vein. Before securing the noose, pressure should be made by the finger on the included texture, so as to make sure that it is the artery. In making the downward dissection, caution is necessary near the clavicle; lest, first, the supra-scapular artery be wounded; and, afterwards, lest the vein should sustain injury. The artery, if cut, proves troublesome by hemorrhage; and, besides, the vessel is important as a means of collateral circulation after obstruction of the main trunk. In the great depth which has sometimes to be encountered in this situation, assistance may be derived from one or other of the auxiliary needles which have been invented; but it has so happened, hitherto, that the ordinary instrument, in skilful hands, has been found quite sufficient. In all cases, however, difficulty is to be contemplated; and in the dissection allowance must always be made for the increased depth of the vessel's site, resulting from displacement of the shoulder upwards by the axillary tumor.

To secure the middle third, a plan of incision very similar to that just described will suffice. The fibres of the scalenus are cut across with the greatest possible caution, so as to avoid injury of the phrenic nerve, which may be expected towards the inner margin; and the noose is applied with equal caution, to avoid, as far as possible, the arterial branches of this part of the vessel.

To expose the internal third, on the right side, let an incision be made a little above the clavicle, more anteriorly than in the former operations; and into this a second incision is made to fall, along the inner border of the sterno-mastoid. The sternal attachment of this muscle is then divided and turned aside, outwards. The sterno-hyoid and sterno-thyroid muscles, having been exposed, are divided cautiously from their outer border, and displaced forwards. The lower part of the carotid may then come into view; this is traced downwards, until the subclavian is reached; and this vessel is to be secured as near as possible to the origin of the vertebral, so as to afford space enough between the ligature and the origin of the carotid. The textures to be avoided are the par vagum, and its recurrent branch, the cardiac branches of the sympathetic, the pleura, and the vein. The needle is passed from below upwards, to avoid wounding the pleura and right vena innominata. The operation is one of great difficulty, and not auspicious of a prosperous issue.

The varieties of distribution to which the arteries of the neck are liable, bear an important relation to the operations just described, and should ever be remembered and calculated upon by the surgeon.[1]

Deligation of the Axillary.

Modern surgeons seem to have almost agreed, that this vessel should not be made the subject of operation, unless in the case of wound of itself; when the general principles of surgery are to be fulfilled, by cutting down upon the bleeding point, and placing a ligature above and below the aperture. In the case of aneurism high in the arm, encroaching so far upwards as to render deligation of the humeral either advisable or impracticable, the axillary, no doubt, may be secured; but it is an easier, more feasible, and altogether preferable operation, to tie the subclavian in its external third.

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[1] *Vide* Quain on the Arteries, with special reference to this subject. For the statistics of ligature of the subclavian, see Norris, American Journal of Med. Science, July, 1845.

Like the subclavian, the axillary artery is surgically divided into three portions; an upper, middle, and lower. And supposing that we have determined on deligation of the axillary, in preference to the subclavian—as, probably, will very seldom be the case—either the lower or the upper third will be selected, seeing that the middle is so covered and mixed up with other textures, as to be almost inaccessible—with safety. The operation, accordingly, is said to be either superior or inferior.

The superior operation is performed thus:—The patient having been placed recumbent, with an assistant ready to compress the subclavian in case of accident, an incision is made, about three inches in length, and of a semilunar form—with its convexity downwards; commencing about an inch from the sternal extremity of the clavicle, and extending towards the acromion. Or a similar extent of wound may be made, with its convexity upwards, terminating at the anterior margin of the deltoid. In the one case, the clavicular portion of the pectoralis major is at once cut across, in the deep dissection; in the other, the intermuscular space is dilated. Care must be taken to avoid the cephalic vein and thoracico-acromialis artery. To expose the latter vessel, however, is scarcely an untoward occurrence, as it may happen to prove a convenient guide to the vessel of which we are in search. The deep fascia and fat are carefully cut through; and it may be necessary to turn down the upper border of the pectoralis minor. The vein, probably, will then be first disclosed; this is pressed inwards towards the ribs; and, the artery having been carefully isolated to the requisite extent, the needle is passed from the thoracic to the acromial aspect.

For the inferior operation, the arm is raised from the side, with the hand supinated. In the lower part of the axilla, thus exposed, the head of the humerus is felt; and over this an incision is made of about two inches in length, rather more to the posterior than to the anterior border of the axilla. Then, on dissecting through fascia and areolar tissue, the axillary vein and median nerve are likely to be exposed; the latter having been displaced outwards, and the former inwards, the artery will be brought into view. The needle is passed from the ulnar aspect. In the latter part of the operation, it is useful to relax the textures, by bending the fore-arm.

Deligation of the Humeral.

The brachial or humeral artery may be secured at any part of its course; on account of aneurism, true or false; on account of wound of the vessel itself; or on account of an otherwise uncontrollable hemorrhage from either the hand or the forearm. The arm having been steadied on a convenient table with the hand supinated, the operation is conducted thus:

In the upper part of the arm, an incision of about two inches in length is placed over the vessel—felt pulsating—along the inner border of the coraco-brachialis muscle; and care is taken to avoid the basilic vein and internal cutaneous nerve, which may lie in the way. The fascia having been divided, the ulnar and internal cutaneous nerves, on the inside—the external cutaneous and median nerves, on the outside—the brachial veins close on each side—are avoided; the arm being bent, for the purpose of relaxing these tissues, if necessary. And the vessel having been isolated, the needle is passed from the ulnar aspect. Sometimes the median nerve is superficial to the artery.

At the middle of the arm, the incision is made along the inner border of the biceps muscle, which, overlapping the vessel, may require to be raised slightly. The median nerve is to be expected, superficial to the bloodvessels; and while this nerve is displaced inwards, and the muscle held outwards, the artery may be separated from its veins and secured. It is right to remember, however, that, in this situation, the inferior profunda may be mistaken for the main trunk; and also that, if there be a high division of the humeral, one of the two vessels only may have been tied. Not until the surgeon has been fully satisfied on both of these points, should the operation be completed by approximation of the wound. In the case of high division, the second trunk, if not close to the other, will be found either along the inner intermuscular septum, in a line with the inner condyle of the humerus; or near its usual situation, but deeply placed, and covered by fibres of the brachialis anticus muscle.

In the lower part of the arm, the median nerve is to be expected on the ulnar side of the artery; but it is seldom that we are called upon to operate in this situation; not, indeed, unless for wound of that part of the vessel.

At the bend of the arm, false aneurism of the humeral is proverbially common. If prevention by methodical pressure have failed, the sac is to be cut into, and the vessel secured by ligature above and below the aperture, in recent cases. In tumors of old standing, deligation of the humeral, near its middle, is a simpler and equally effectual operation (*Principles*, 4th Am. Ed. p. 520). Varicose aneurism, occurring at this site, requires the same treatment as the ordinary form of tumor. For aneurismal varix, support by careful bandaging is usually sufficient (*Principles*, 4th Am. Ed. p. 522).

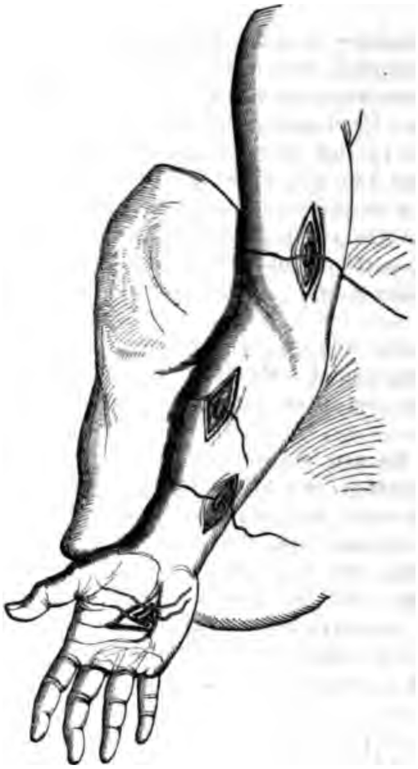
Deligation of the Arteries of the Forearm.

Deligation here is seldom if ever required, except in the case of hemorrhage from injury of the arteries themselves; and then it is sufficient to dilate the existing wound, and to secure the bleeding point, or points, in the usual way. For secondary bleeding in the palm, ligature of both ulnar and radial would not suffice; the interosseous must also be secured. And, instead of this threefold and difficult operation, it is infinately better at once to perform that which, while much simpler, is equally effectual—deligation of the humeral a little below its middle.

The radial and ulnar arteries are most easily reached at the lower part of the forearm. For the radial, an incision is made on the radial side of the flexor carpi radialis. For the ulnar—made more superficial by bending back the hand and fingers[1]—the wound is placed on the radial side of the flexor carpi ulnaris. Near the elbow joint, the vessels can be exposed only through a great thickness of muscular tissue. The prolongation of the radial, between the metacarpal bones of the thumb and fore-finger, may be exposed by an incision on the ulnar aspect of the extensor secundi internodii pollicis.

Wounds of the Palmar Arch are apt to be troublesome by bleeding, both primarily and secondarily. In recent wounds, all bleeding points should be secured by ligature; dilatation being practised, if necessary, and moderate pressure afterwards applied. For bleeding occurring after the lapse of some days, exposure of the wound, with application of energetic pressure, should be had recourse to; and if this fail, then deligation of the humeral should be practised.

Fig. 136.



Deligation of the humeral, radial, and ulnar arteries; also of the palmar vessels.

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[1] Malgaine, Brit. and For. Med. Chir. Rev. July, 1848, p. 265.

Ramsden, Practical Observations, &c., London, 1811. Liston, Ed. Med. and Surg. Journal, vol. xvi, p. 348. A. Burns on the Surgical Anatomy of the Head and Neck, Edin. 1824. Dietrich, Das Aufsuchen, &c., Nurnberg, 1831. Manec on Ligature of Arteries, Paris, 1832. Harrison, Surgical Anatomy of the Arteries, Dublin, 1833. A. Cooper, Guy's Hospital Reports, vol. i, p. 53, 1836. R. Quain, Anatomy of the Arteries, with large plates, *Lond.* 1840.

CHAPTER XX.

AFFECTIONS OF THE BEND OF THE ARM.

Venesection.

THIS little operation—at one time, it is to be feared, too frequently performed—is conducted thus:—The patient having been placed erect, semi-erect, or recumbent, according as it is wished to withdraw much blood or otherwise (*Principles*, 4th Am. Ed. p. 139), a ligature—a riband, or bandage, or small tourniquet—is placed on the upper part of the arm, and secured with sufficient tightness to arrest the venous return, yet not so tightly as to interfere with the arterial influx—as indicated by the pulse at the wrist. The veins at the bend of the arm, thus made tense and bulging, are scrutinized with a view to selection. A branch which is superficial, and large enough to emit freely, is to be preferred, for obvious reasons; and, if possible, the median cephalic is chosen; for then we are less likely to interfere with the brachial artery, the fascia of the fore-arm, or the cutaneous nerves; and thus are avoided the risks of aneurism, diffuse inflammatory infiltration, and neuralgic pain. But if no vessel except that over the brachial is found suitable—as not unfrequently happens—then the operation must be conducted there with especial caution; care being taken merely to open, not to transfix the vein. The arm is placed nearly in a middle posture between pronation and supination; and precautions are taken to secure its being retained in that position unmoved. By the fingers or thumb of one hand—and it is well that the surgeon be ambidextrous in this proceeding—the vein is steadied; and, pressure being made at the same time on the distal aspect, spurting from the puncture is prevented. The lancet—neither too spear-pointed nor too rounded in its blade—held between the finger and thumb of the other hand, is introduced obliquely across the track of the vessel; and by gentle movement of it a sufficient aperture is made—the instrument cutting more with the shoulder than with the point, so as to insure the superficial part of the wound being considerably more

Fig 137.

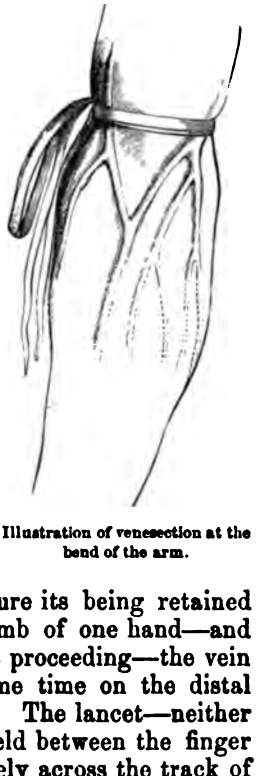


Illustration of venesection at the bend of the arm.

free than the venous orifice. Then the blood is allowed to flow. If the stream grow sluggish, movement of the fingers will tend to its increase by forcing the contents of the intermuscular veins to the surface, and accelerating the general venous return; but care must be taken to avoid any deviation from the original position of the limb, otherwise an overlapping of the wound by integument will necessarily follow. The desired effect having been obtained, the ligature on the arm is slackened and removed; a thumb is placed on the wound; the arm is sponged and made clean; a neatly-fitting graduated compress is applied; by a bandage passed in the form of 8, all is secured; and the limb is placed comfortably in a bent posture, supported if need be by a sling. Within forty-eight hours, the bandage may be safely withdrawn; but it is well to avoid use of the arm for some days.

Accidents of Venesection.

1. *Thrombus.* By this term is understood an accumulation of coagulated blood in the areolar tissue between the vein and integument; caused probably by overlapping of the latter; interfering with, and perhaps arresting, the flow of blood at the time of the operation; producing an inconvenient swelling afterwards; and not unfrequently inducing troublesome suppuration in and around the wound. The accident is to be avoided, by a suitably free opening being made at once, and by maintenance of one position of the arm throughout the whole proceeding. When thrombus has formed, the coagulum should be carefully removed, an enlargement of the wound being had recourse to, if necessary; and then a suitable compress is accurately applied, so as to keep the tissues in close contact. 2. *Neuralgic pains* may invade the limb; dependent, probably, on puncture of a cutaneous nerve. To avoid such accident, place the wound where this texture is least likely to be implicated; to cure it, dilate the wound by incision, and apply an anodyne epithem. 3. Simple *erysipelas* may follow; and the ordinary treatment is required (*Principles*, 4th Am. Ed. p. 337). 4. *Angeioleucitis* may occur *per se*, or in conjunction with the preceding affection. There is no peculiarity in the treatment (*Principles*, 4th Am. Ed. p. 543). 5. Not unfrequently, *diffuse inflammation* occurs beneath the fascia, which has probably been injured by puncture. Free incision is imperatively necessary; otherwise serious results, both local and constitutional, are almost certain to ensue. 6. Sometimes this last accident is associated with a superficial and simple erysipelas, or erythema. 7. *Aneurismal formations* have been already considered. And in reference to these it is well to remember, that the arteries of the forearm, following an unusual course, may be found quite superficial, and not unlike the ordinary veins. Hence a careful examination of the part should uniformly precede the performance of phlebotomy.[1]

[1] Lately a new variety of the aneurismal lesion has been observed; the artery projecting its contents *through* the wounded vein, and forming an aneurismal sac by condensation of the areolar tissue exterior to the vein. The deep wound of the vein is closely incorporated with that of the artery; and the superficial venous aperture is continuous with the arterial sac.—Brit. and For. Med. Chir. Rev. April, 1850, p. 338.

Sometimes, too, the aneurismal communication is not with the superficial, but with a *deep* vein.—*Ibid.* p. 349

Affections of the Bursa over the Olecranon.

From habitual pressure—as in the miner—this bursa is liable to chronic enlargement, and the affection is to be treated in the ordinary way; by abstraction of pressure, and the application of discutients (*Principles*, 4th Am. Ed. p. 475).

Acute bursitis is a frequent consequence of blows on the elbow; and is usually associated with an erysipelatous affection of the surface. Treatment is by puncture and general antiphlogistics; and if matter form within the bursa, it should be early evacuated by free incision.

Lisfranc, Nouvelles Considerations sur la Saignee du Bras, Paris, 1813. Abernethy on Ill Effects of Bloodletting, Surgical Works, vol. ii, p. 133, Lond. 1815. Wardrop on Bloodletting, &c., Lond. 1825. Marshall Hall on the Effects of Bloodletting, Lond. 1836.

CHAPTER XXI.

AFFECTIONS OF THE WRIST AND HAND.

Ganglia and Thecal Collections.

GANGLIA frequently form on the wrist and back of the hand. When troublesome as well as unseemly, they may be got rid of, either by pressure, or by puncture of the cyst (*Principles*, 4th Am. Ed. p. 478).

Collections of glairy fluid often occur in the thecæ of the flexor tendons in the lower part of the forearm, with or without loose bodies contained; forming a soft bulging swelling, which usually extends also to the palm; more or less seriously interfering with the functions as well as with the symmetry of the limb. In the worst cases, it has latterly been the practice to make a free evacuating incision, dividing the annular ligament at the wrist completely through, in the belief that thus tension during subsequent inflammatory accession will be avoided. But experience has yet to show, that the deformity and loss of power which result from condensation and deposit among the tendons by such cure, are less than those which attended the previously existing state of parts (*Principles*, 4th Am. Ed. p. 477).

According to Velpeau, it is both safe and effectual to evacuate the contents by a trocar's puncture; and then to inject iodine—as in the cure of hydrocele.

Paronychia.

No affection is more common than paronychia, or *Whitlow;* more especially among washerwomen, cooks, nurses, and others, whose fingers, by the nature of their avocations, are not only kept prone to the assumption of inflammatory disease, but also much exposed to the application of its exciting causes. The whitlow varies both in site and intensity.

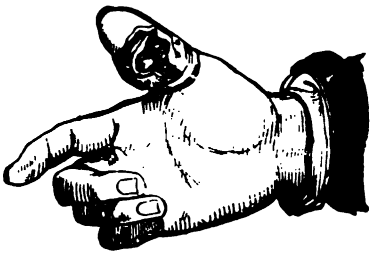
1. There is a mild form, limited to the very surface. The finger, at its point, and perhaps in its whole extent, is intensely hot and painful, red, and somewhat swollen; and vesications may be in process of forming. Treatment consists in leeching, fomentation, and general antiphlogistics. Or—as is more frequently practised—the part is rubbed lightly over with nitrate of silver, so as to blacken and desiccate the surface (*Principles*, 4th Am. Ed. p. 158). Resolution is usually effected; but often not without the formation of one or more vesicles—which sometimes degenerate into superficial ulcers of an irritable character. The disease usually commences at the root of the nail, a hot and painful blush

of redness surrounding this; and hence the term. In consequence of the matrix of the nail, in many cases, being primarily and permanently affected, shedding of the nail need be no unlooked-for event.

2. A somewhat more serious attack is found to pervade the subcutaneous areolar tissue, as well as the skin; bearing the same analogy to the former affection, as phlegmonous erysipelas does to erythema. It is usually caused by a puncture, laceration, or other wound; with or without inoculation of irritant matter. The swelling, heat, redness, tension, and pain are greater; and there is a proneness towards acute suppuration. Treatment must be proportionally active; copious leeching, at the sides of the finger; or free puncturing of the affected parts; active constitutional antiphlogistics; fomentation and poultice; early incision, if need be, as in phlegmonous erysipelas—not waiting till diffuse suppuration has formed (*Principles*, 4th Am. Ed. p. 342).

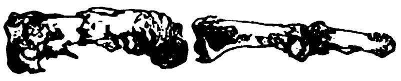
3. The worst form is the most deeply seated; and, unfortunately, not the least frequent in occurrence. The disease originates in the deep fibrous textures; sometimes, there is every reason to believe, in the periosteum, or immediately exterior to it. Pain is excruciating from the first. For days and nights the patient may enjoy not a moment's sleep, or respite from suffering. Tension and throbbing are early and intense; so are the swelling, heat, and redness. The back of the hand, and sometimes part of the forearm, are red and greatly engorged with serous effusion. Matter forms early in the finger; deep, and confined, and consequently with aggravation. The constitution labors under inflammatory fever, often severe. At the outset, active antiphlogistics, locally and generally, are to be employed—copious leeching, fomentation and poultice, purging and antimony—with the hope of averting suppuration. Failing these, there is no relief to suffering, and no means of averting serious destruction of texture, but by early and free incision. It seems harsh practice to lay a finger open throughout almost its whole extent, on the palmar aspect; but, soon after the infliction of such a wound, pain will rapidly abate, and in a short time the patient will probably be in a deep unconscious slumber. Free outward suppuration takes place; the swelling abates; bones, joints, and tendons are saved; and the finger recovers, tediously it may be, but well. Withhold the incision, and there comes no relief but on spontaneous evacuation of the matter; and then bones are found carious or necrosed, joints are opened into, tendons are sloughing or sloughed; the fingers may recover, in some sense, but

Fig. 138.



Danger of delaying incision, in the worst form of paronychia, exemplified. Thumb lost in consequence.

Fig. 139.



The illustration carried further; after maceration.

are stiff and useless; more frequently, amputation is demanded sooner or later.

In both of the more severe forms, extension to the palm is by no means unfrequent. The same principles of treatment are to be fulfilled there as in the finger. But in incising, care must be taken to avoid, if possible, wound of the palmar arch.

Sometimes the virulent form of paronychia is limited to the distal joint of the finger. Then exfoliation of the corresponding phalanx is extremely probable. But, fortunately, the whole bone seldom comes away; a portion at the articulation remains; and, from this, regeneration may take place, with but little ultimate deformity.

Onychia.

This term denotes a diseased condition of the matrix of the nail; the result of a chronic inflammatory process, inducing intractable ulceration. The first indications are pain, swelling, and redness, around the root of the nail; and, on pressure being applied, an ichorous discharge oozes from beneath the cuticle at this part. The nail separates more and more, and is ultimately detached; disclosing an angry ulcer, of irregular margin and tawny surface, surrounded by dusky redness, emitting a thin fœtid discharge, and the seat of intense pain. Usually, an aborted reproduction of the nail protrudes from the upper part of the sore.

The indications of treatment are simple. To pluck away the stunted nail; by an escharotic—as the potassa fusa or nitric acid—to destroy the morbid texture; and, on separation of the slough, to make such application to the sore as its varying state may seem to require. In almost all cases, however, local treatment is not alone sufficient. The general health will be found greatly disordered. Alteratives and tonics are necessary; and, in some cases, a mild mercurial course is followed by the best effects.

Certain cases are very obstinate, and to such the term *Onychia maligna* has been applied; inappropriately, however, inasmuch as the sore, however unmanageable, possesses none of the characters of true malignancy. In such cases, the escharotic application must be made with unusual intensity; or, under chloroform, the diseased parts may be shaved off with a knife; and if, by this means, a satisfactory granulating surface cannot be obtained, it is well at once to perform amputation of the phalanx. This summary procedure is still more especially indicated, in those examples of the inveterate form in which the bone has become involved.

Onyxis.

Onychia occurs in both toes and fingers. Onyxis is usually confined to the former. By this term is understood a faulty condition of the margin of the nail; original or secondary; causing, or connected with, an irritable fungous sore of the soft parts. The root of the nail not unfrequently is surrounded by a red and swollen integument. The general matrix is sound; but, occasionally, onychia follows on the minor affection.

Whether the nail have been originally to blame, or not, it is very important to remove its injurious contact with the angry sore beneath. For this purpose, either mild or rude measures may be employed; the former in the first instance. The nail is softened, and having been scraped thin, has its edge gradually and gently elevated above the fungous granulations; and then there is interposed a layer of soft lint, or other suitable substance. The nail having been thus permanently elevated, the freed sore abandons its irritable character, and may be brought to heal under the ordinary applications. But, failing such measures, partial evulsion of the nail is to be had recourse to; a harsh-seeming remedy, but very effectual. The nail having been softened and thinned as before, the blade of strong sharp-pointed scissors is run up from the point to the root; the nail is severed at that part by one stroke; the isolated portion of nail—usually about a quarter of the whole—is then laid hold of by strong dissecting forceps, one blade of which is pushed beneath; and by a sudden wrench evulsion is effected. Unless under chloroform, the pain is great, though momentary. Hot poultice or water-dressing is applied. A healthy character of sore, generally, soon appears; and healing is not long delayed.

Contraction of the Palmar Fascia.

The whole aponeurosis may be rigidly contracted; or a portion only, connected with one or more fingers. When the whole is involved, all the fingers are rigidly bent, and the hand consequently is not only much deformed, but almost entirely useless. The disease is most frequent in those who use the fingers much; and is but little amenable to treatment. Obviously the change depends on a chronic inflammatory process affecting the aponeurosis; and is to be met in its early stage with leeching, mercurial friction, local use of iodine, &c. The partial form is common in those of the better ranks, who are much given to horseback exercise, and other field sports. In some of these cases, amendment may follow subcutaneous division of the affected portion of the fascia, the finger being subsequentty straightened by the application of a splint and bandage.

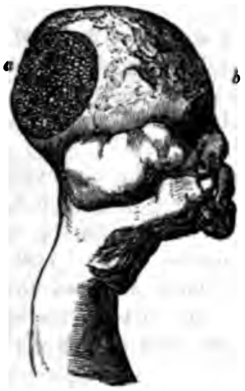
Spastic flexion of the thumb not unfrequently occurs during childhood, in connection with intestinal irritation. It is treated by the application of splint and bandage, while by purgatives and alteratives the primæ viæ are rectified.

Those who write much are liable to troublesome spasm of the thumb; sometimes called *writer's cramp*. Treatment consists in rest of the part, with tonics constitutionally and locally.

Tumors of the Metacarpal Bones and Phalanges.

Exostosis may occur; but is rare. Treatment is seldom if ever required, the affection proving but little troublesome. *Osteo-cystoma* is

Fig. 140.



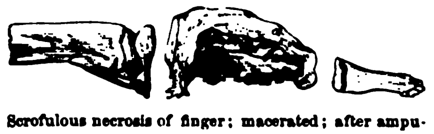
The large enchondroma referred to. At *a*, a section made to show structure. At *b*, the ulcerated surface, whence the bleeding came.

more common (*Principles*, 4th Am. Ed. p. 421). Its treatment depends upon the bulk. If small, it is incised; and, on pressure being subsequently applied, contraction and healing will probably ensue. Or, if need be, a seton is passed and temporarily retained; and thus the desired obliteration is effected. Those of large size, involving the whole periphery of the bone, warrant amputation of the affected part. *Enchondromata* have here their most frequent site (*Principles*, 4th Am Ed. p. 420). If small and external, the tumor is dissected off, and the bone left uninjured. Those which affect the whole bone, require amputation. Generally, the tumors are not single; yet usually we are able to save a part—and sometimes the greater part—of that most useful organ, the hand; the avowed non-malignancy of this tumor admitting of incisions being made very close to the morbid formation. Sometimes, however, the size and connections of the tumor are such as to demand amputation of the whole hand. Lately I had occasion to remove one of great size, weighing fourteen pounds. From the apex of the tumor repeated and serious hemorrhage had taken place; and it was satisfactory to find, on a careful examination after injection, that the blood had escaped from ulcerated openings in large superficial veins, not from any degeneracy in the structure of the tumor itself.

Other Diseases of the Metacarpal Bones and Phalanges.

These bones are especially liable to the inflammatory casualties—ulcer, caries, and necrosis. The ordinary treatment is to be put in force. When, as a last resource, amputation is unavoidable, one general rule should never be forgotten, viz., that it is our duty to save as much as circumstances will possibly permit—a portion of the original hand being a much better organ of prehension, than any artificial substitute, however ingeniously constructed.

Fig. 141.



Scrofulous necrosis of finger; macerated; after amputation.

Frequently, in consequence of whitlow, or inflammation traumatically induced, it may be in our power to retain a finger, but not without complete anchylosis of all its articulations. And, under such circumstances, it comes to be a question whether it were not better to amputate such a member at once, before anchylosis and cicatrization have occurred; thereby not only shortening the cure, but also rendering the hand much more useful—especially in the case of the laboring man, by whom a stiff finger is felt to be constantly in the way. I believe that the question is to be answered in the affirmative—in favor of amputation. The thumb, however, is in all circumstances to be preserved, if possible. Rigid or not, it proves extremely serviceable.

Another question arises in the case of a hopelessly diseased metacarpal bone, whose corresponding finger is perfectly sound. May the metacarpal bone be removed alone, or must the finger be taken along with it? The latter is the preferable practice. The finger left without its metacarpal bone is worse than useless.

Two or even three metacarpal bones, when carious, may be removed, with their corresponding fingers. The operation is preferable to amputation of the whole hand. For the paramount general rule of saving as much as possible, should ever be respected in such cases. Some years ago in amputating a metacarpal bone, its base was found carious, and also the corresponding portion of the carpal range. The latter diseased part was removed by means of a gouge; and a most satisfactory cure resulted.

Hypertrophy of the Fingers.

This rare departure from ordinary nature has been occasionally noticed in young people; affecting one or more fingers; originating from no assignable exciting cause; consisting of true hypertrophy of all the textures—bones, joints, tendons, skin, and nails; and accompanied with more or less deformity, and loss of function. Firm and continued pressure may moderate the unnatural growth. If not, inconvenience may be mitigated by amputation—partial or complete.

Congenital Deformities of the Hand.

Supernumerary fingers are usually attached, not by articulating apparatus, but by ordinary integumentary tissues. Their amputation is accordingly very easily effected.

Webbed fingers are often hereditary; and in some parts of the country are held in esteem. Should their amendment be wished, that is obtained by division of the abnormal band; great care being taken, during cicatrization, to prevent reunion of the opposed parts. And, for this purpose, interposition of dressing is not enough; it is essential, as in the case of burns (*Principles*, 4th Am. Ed. p. 607), to make constant and considerable pressure on the angle of union, at the knuckles; and this is done by means of a piece of cord or tape, placed and retained there.

Club-hand, a condition of the hand analogous to club-foot, occasionally occurs. It is remediable, at an early age—with or without the aid of tenotomy—by the wearing of suitable apparatus. And to the machinist, the management of such cases is usually intrusted. It is also the province of that profession to atone, by mechanical substitutes, for *deficient development* of the hand or fingers.

Vogt, de Paronychia, Viteb. 1803. Wardrop, an Account of some Diseases of the Toes and Fingers, &c., Med. Chir. Trans. vol. v, p. 129. Duteil, Dissertation sur la Panaris, Paris, 1815. Cragie, Pathological and Practical Observations on Whitlow, Ed. Med. and Surg. Journal, April, 1828, p. 255. Dupuytren, Clinique Chirurg. t. i, art. 1.

CHAPTER XXII.

DISEASES OF THE ARTICULATIONS OF THE SUPERIOR EXTREMITY.

Disease of the Shoulder-Joint.

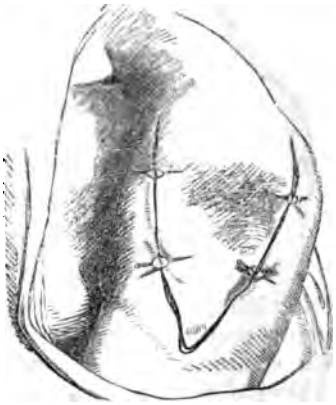
THIS joint, like others, is liable to the ordinary affections of such parts. But it is perhaps especially liable to disorganizing disease, involving all textures ultimately, and usually originating in the cancellated tissue of the head of the humerus. To this the term *Omalgia* was formerly applied; very inappropriately, because apparently inferring that the disorder was of the nature of irritation, or neuralgic, not structural and inflammatory. It may occur at any age; and very frequently its origin is connected with external injury. One of the first and most prominent symptoms is wasting of the deltoid; ultimately giving a prominence to the acromion. The arm is incapable of exertion; and pain in the joint is increased by motion, especially when the arm is raised. Bending takes place at the elbow; and the limb projects awkwardly from the body, feeble and wasted, and apparently increased in length. The shoulder simulates luxation. And, at length, this result may actually occur; disorganization of the joint having become complete. The constitution does not fail to suffer, in sympathy with the progress of this grave disorder. Swelling, as usual in primary affections of the hard tissues, is of secondary occurrence, and is seldom very great; evacuation, by external opening, being soon attained by Nature's own effort.

Treatment is to be conducted on general principles. But, true caries having been established, with an open condition of the joint, it becomes very improbable that spontaneous cure will take place; and usually the general health is then seriously and obviously on the decline. In such circumstances, the diseased parts must be removed by operation; by amputation of the limb, or by resection of the joint. The latter operation is obviously preferable, when not expressly contra-indicated (*Principles*, 4th Am. Ed. p. 469).

Resection of the Shoulder-Joint.

To expose the articulation, a flap may be made from the outer and fore-part of the deltoid; or a single incision may be placed longitudinally, over the outer aspect of the joint, the knife being entered below the acromion, and pushed at once down to the head of the humerus. In many cases the latter mode is quite sufficient; and, being less severe, is be preferred. The knife and finger having penetrated the joint, the maining portions of the retaining apparatus are divided—more espeally the muscles inserted into the tubesities of the humerus, towards which e finger is the best guide—and the dissed head is then made to show itself, d project through the wound; the limb ing with this view brought forcibly ross the thorax. By a saw, abbreviaon is made to the required extent. he glenoid cavity is then examined; d, if found diseased, the affected part taken away, by means of cross-cutting iers, or by a gouge. Bleeding having en arrested, the parts are accurately poned; the wound is brought together, d the limb is retained steadily in a nvenient posture. Healing by granution is to be expected; with the formaon of an artificial joint, more or less mpetent to assume the functions of e original. Often it proves in all respects an admirable substitute. nd thus many useful limbs may be retained, under circumstances hich, but a few years since, would have called for nothing short of ampution.

Fig. 142.



Flap, placed in position, after resection of the shoulder-joint.

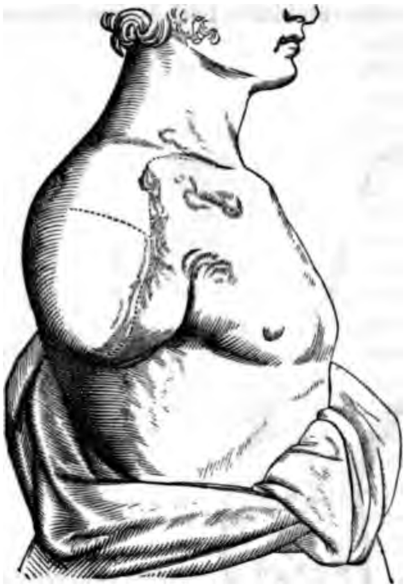
The operation may also be required, primarily, on account of injury one to the bone; as by gunshot wound.

[In the last American edition, Dr. Sargent refers to the occasional ecessity for much more extensive resections in this region, which may volve the removal even of the whole scapula and clavicle, together ith the arm, or subsequently to the amputation of the latter.

In 1837, for example, Dr. Mussey removed the entire scapula and lavicle at one operation; having, six years before, removed the humerus f the same person, at the glenoid cavity. In 1838, also, Dr. G. M'Clelan amputated the whole of the upper extremity at one operation, including the arm, scapula, and clavicle; the latter being sawn through at s junction with the sternum—the sterno-clavicular articulation not being pened. Rigaud, of Strasburg, and Fergusson, of London, have each emoved the whole of the scapula, together with a portion of the clavicle, n both instances some time after amputation of the affected extremity, t the shoulder-joint. Other similar operations, of greater or less extent, re of course on record. Among the more recent, in this country, may e mentioned the two cases of amputation above the shoulder-joint, by r. Gilbert, of Philadelphia, one in 1847 (Am. Jour. Med. Sci. for Ocober, 1847), and another in 1854 (Med. Exam. Oct. 1854). The opeation of Mr. Fergusson is described in his *Practical Surgery*, Am. Ed. 853, and is illustrated by the accompanying cuts.]

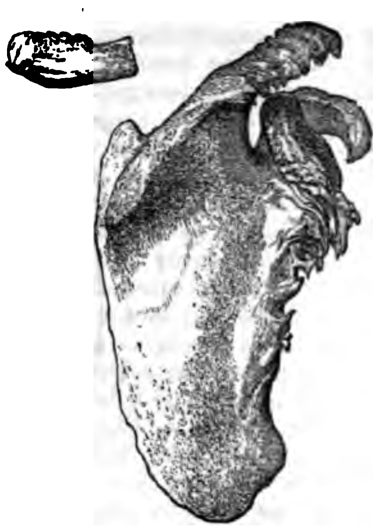
[See Chelius, vol. iii; Fergusson's Practical Surgery; M'Clellan's Principles of Surgery; m. Jour. Med. Sci. vol. xxi, 1837, and vol. xiv, N. S. 1847; Medical Examiner (Philad.), 1854.]

Fig. 143.



[Plan of Mr. Fergusson's Operation; the black lines representing the incisions.]

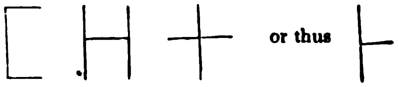
Fig. 144.



[Appearance of the Scapula and Acromial end of the Clavicle of Mr. Fergusson's patient.]

Resection of the Elbow-Joint.

Few affections are more common than articular disease at the elbow. And not unfrequently it advances to disorganization; with or without strumous complication. To this joint, more than any other, the operation of resection is applicable; care being always taken to select the case according to the ordinary tests (*Principles*, 4th Am. Ed. p. 469); lest, resection failing, amputation become necessary, and we discover, when too late, that the patient who could have stood one operation well, must inevitably sink under both. The patient having been placed prone on a table, or seated with his back to the surgeon, and with the arm extended and held by an assistant, the joint is exposed from behind, by cutting, so as to form flaps; and the flap may be single, double, or quadruple;

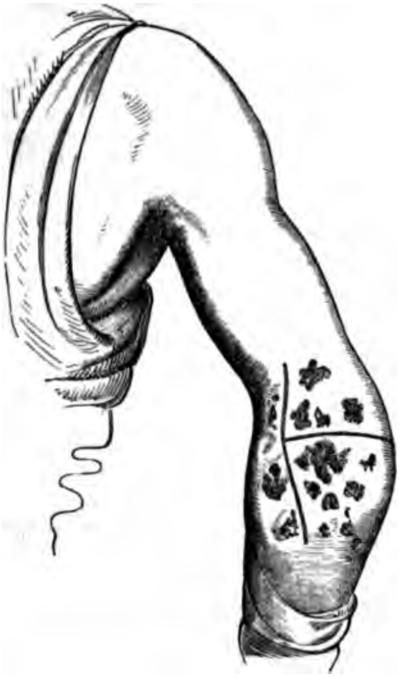


The figure of the letter H is usually preferred.

In freeing the soft parts from the inner condyle, and reflecting them over it, care is necessary to keep the ulnar nerve safe. The insertion of the triceps having been cut across, on bending the arm the olecranon is made prominent; and this, having been separated from its connection with the soft parts, is removed by saw or pliers, to the requisite extent.

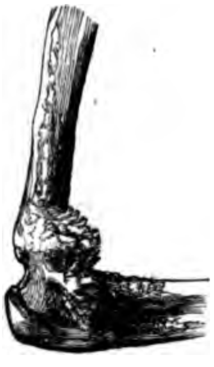
The joint can now be very readily dislocated; the condyles of the humerus are isolated and sawn off; and the upper part of the radius, usually, is also removed—the saw being preferred, to avoid bruising of the softened bone. Removal of the olecranon by pliers is mainly to facilitate disarticulation; afterwards it is usually necessary to saw away so much more of the ulna as may seem hopelessly diseased. Should any suspicious portions appear at or near the cut surfaces, the gouge may be directed against them. Bleeding having been arrested, and the wound brought loosely together, the limb is secured in a slightly bent posture. Suppuration and granulation follow; the wound slowly closes; and an artificial joint by ligamentous structure is ultimately constructed —often of remarkable usefulness.

Fig. 145.



Incision marked for resection of the elbow, on the right arm.

Fig. 146.



Caries of the elbow; mainly affecting the condyle of the humerus. The vegetative effort around the carious surface well exemplified.

Resection of the Wrist.

It were easy enough to remove by operation the articulating ends of the radius and ulna, and to gouge out the affected parts of the corresponding surfaces of the carpal bones; but the proceeding is not found to succeed. And, consequently, when this joint is deemed irreclaimable, amputation is preferred. Fortunately, a vast proportion of the cases of scrofulous disease of this joint, in adolescents, recover under use of cod-liver oil, and general antistrumous treatment—with or without anchylosis.

Moreau, Resection des Articulations, &c., Paris, 1803. Roux, de la Resection des Portions d'Os, &c., Paris, 1812. Crampton, Dub. Hosp. Reports, vol. iv, 1827. Velpeau, Nouv. Elem. de Méd. Opérator, tom. i. Syme on Excision of Joints, Edin. 1831. [Chelius, vol. iii; Fergusson's Practical Surgery; McClellan's Principles of Surgery; Am. Jour. Med. Sci., vol. xxi, 1837.]

CHAPTER XXIII.

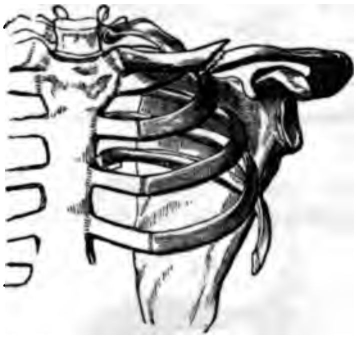
INJURIES OF THE SUPERIOR EXTREMITY.

FRACTURES.

Fracture of the Clavicle.

HE clavicle is frequently broken; and usually by violence applied to acromial extremity, as by falls on the shoulder. The fracture is erally oblique, and near the centre of the bone. The limb is power- , the part is pained and swollen, mpted movement aggravates the ı, and the shoulder is both sunk drawn towards the sternum. Dis- ;ement is caused by depression of lower fragment; whereby the nal portion is made very promi- t, causing palpable deformity, and aing to be out of place, though y remaining nearly *in situ*—the on of the pectoral and sterno- toid muscles nearly neutralizing ı other, and the bone being also died by the costo-clavicular liga- t. The acromial portion is drag- downwards by the weight of the ; and forward and inwards by the action of the subclavius—the at- ment of this muscle to the first rib being then the fixed point.

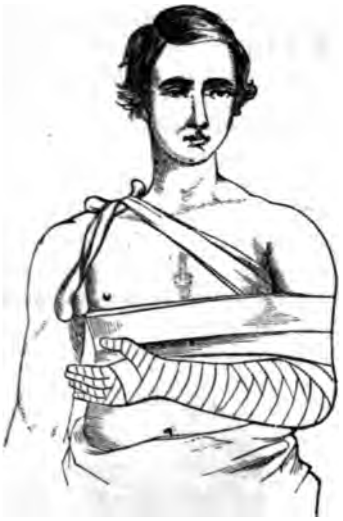
Fig. 147.



[The ordinary site of Fracture of the Clavicle. (From Fergusson.)]

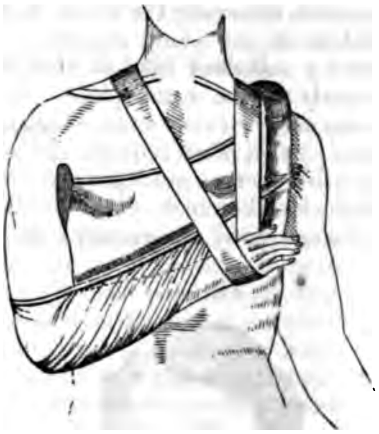
he indications of treatment are plain, but unfortunately not very ly fulfilled. They are, to raise the acromial portion to the same level ı the sternal; to retain it there; and at the same time to keep the ılder removed from the sternum, so as to prevent displacement in- ls, and consequent "riding" of the ends of the bone. Many and plicated are the means devised for this end. The simplest, most ly obtained, and not the least efficient, are as follows: A wedge- ed pad is placed in the axilla, sufficiently large to occupy that ty completely. The best pad is made of horse-hair, covered with leather; but any temporary substitute may be taken at the first sing. By means of a shawl or large handkerchief, within which it is placed, the pad is scarcely lodged in the axilla; and, by tying the ends over the opposite shoulder tightly, elevation of the shoulder, and consequently of the acromial portion of the clavicle, is effected; and the latter indication is further contributed to, by placing the forearm in a short sling, well tightened over the elbow. To maintain extension of the bone is more difficult. Carry a bandage, handkerchief, or other ligature, across the chest—including the lower part of the arm on the injured side, arranging it so that the arm shall be both approximated to the chest, and carried well backwards, making the humerus a lever, which acting on the pad as a fulcrum forces the shoulder outwards. And, if need be, maintain approximation of both scapulæ by means of a figure of 8 bandage, so as to complete and secure the readjustment. It is well also to relax the sterno-mastoid by attention to the position of the neck, for sometimes this muscle would seem to succeed in elevating the sternal portion slightly. Retention will be more easily effected in the erect or semi-erect than in the recumbent posture. The knot over the shoulder may gall the patient, and, to prevent this, the skin should be well protected by suitable pad-

Fig. 148.



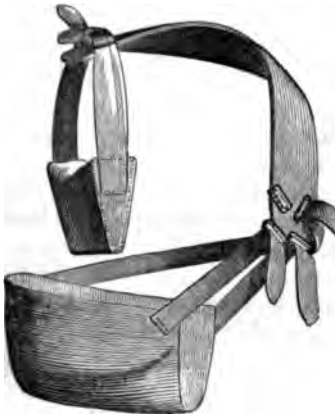
Simple Bandaging suitable for Fractured Clavicle. The sling omitted.

Fig. 149.



[Dr. Fox's Apparatus applied. (From Sargent's Minor Surgery.)]

Fig. 150.

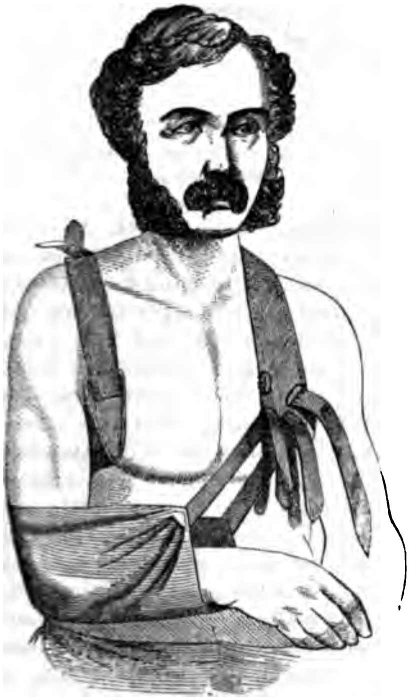


[Levis's Dressing for Fractured Clavicle. (From Am. Jour.)]

ding. The application of pressure over the site of fracture can be productive only of evil. The integuments may be induced to slough, and an injury, originally simple, may be rendered compound. In females, for obvious reasons, the treatment is to be conducted with especial care.

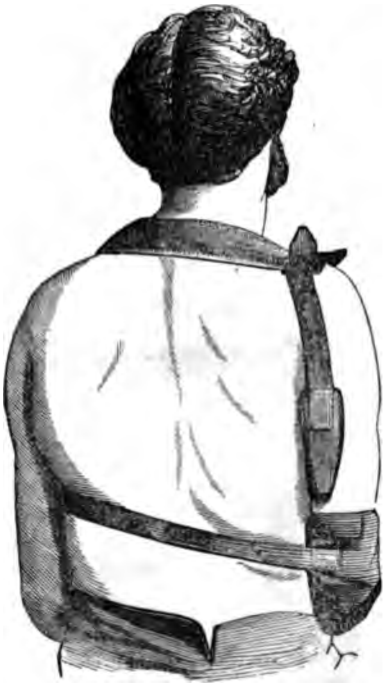
[The well-known apparatus of Dr. Fox, is preferred by Dr. Sargent, and is very generally used in this country, especially in Philadelphia. In this apparatus the indications are answered by means of careful adjustment of the linen sling, which envelopes the whole forearm of the injured side from elbow to wrist, and is attached and supported at both extremities, especially the elbow, with strong inelastic bands, to the ring-like cushion on the sound shoulder. The accompanying figure (149) will afford a sufficient idea of this dressing as applied, the details being scarcely needed in this place. When properly employed *and frequently —say once or twice daily—readjusted*, it succeeds well enough in most cases; but it often requires the aid of other bandaging, and should never be relied upon as much more certain or permanent in its action, than the simple handkerchief, or the bandage of Desault or of Velpeau. Vigilance and good management on the part of the surgeon, are indispensable here, as with every other mechanical arrangement. Some excellent forms of apparatus have recently been described and recommended

Fig. 151.



[Front view of Levis's Apparatus applied. (From Am. Jour.)]

Fig. 152.



[Back view of same.]

by Dr. Frank H. Hamilton, in his able and instructive paper on deformity after fracture of the clavicle, in the Transactions of the Am. Med. Assoc. vol. 8, 1856. They may be regarded as modifications of the plan of Dr. Fox; but one of the most convenient as well as neatest improvements, appears to be the ingenious and simple contrivance of Dr. R. J. Levis, of Philadelphia, which is here represented in Figs. 150, 151, 152 (from Am. Jour. Med. Sci. for Jan. 1856). In troublesome cases, broad strips of adhesive plaster are found to be extremely useful adjuvants to the different forms of apparatus, as substitutes for the ordinary bandage. These adhesive bands might be used in most instances with advantage, as the least likely to slip or otherwise yield, so as to disturb the fragments.]

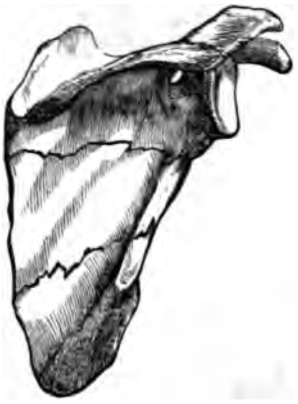
Fracture of the Body of the Scapula.

The body of the scapula may be broken across, by violence directly applied, or even by muscular force alone. There is but little displacement, or deformity. The part is pained, swollen, and limited in voluntary motion; and, while movement is made, crepitus can be distinctly felt by the hand placed flatly on the part. In treatment, it is sufficient to restrain motion, by wearing the arm in a sling, and by having a broad flannel bandage passed tightly over the chest, including the fractured bone.

Fracture of the Acromion.

The acromion process may be detached from the spine of the scapula, by direct violence. There are pain, swelling, and loss of power, and a depression can be felt at the injured part, in consequence of the fractured portion being drawn downwards on the head of the humerus, by the action of the deltoid muscle. At the same time, the clavicle is drawn downwards and forwards on the coracoid process, by the subclavius, and by the action of the deltoid and pectoralis major muscles overcoming that of the trapezius and sterno-cleido-mastoid. Crepitus is not felt on rotating the limb, until the arm has been raised, for then only can the fractured portions be brought into apposition. In treatment, it is sufficient to raise the arm fully by means of a sling, and to prevent motion by suitable bandaging to the trunk. No pad should be placed in the axilla, otherwise the hiatus between the fractured portions will probably be increased. Union is generally by ligament.

Fig. 153.

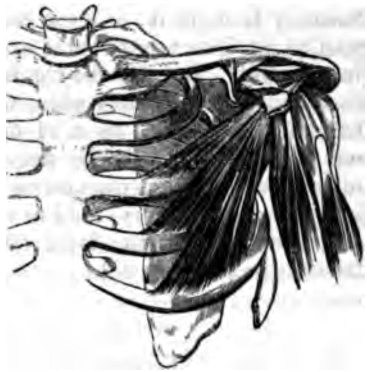


[The ordinary position of Fractures of the Body and Acromion Process of the Scapula. (From Fergusson.)]

Fracture of the Coracoid Process.

This injury is also the result of direct violence. The fractured portion displaced downwards, by the ac- n of the coraco-brachialis, pecto- lis minor, and biceps muscles. iere are pain and swelling of the rt, with loss of power in the limb; d crepitation is felt on rotating limb, after the forearm has been xed, and the arm carried across chest, in order to relax the mus s connected with the process, and to permit replacement of the frag- nt. In treatment, it is sufficient make this relaxation permanent. ie fingers of the injured limb are ide to touch the shoulder of the posite side, and that position is cured by bandaging.

Fig. 154.



[Fracture of the Coracoid Process of the Scapula. (From Fergusson.)]

Fracture of the Neck of the Scapula.

This accident—separation of the glenoid cavity and coracoid process m the body of the bone—is the result of great and direct violence, d, like the preceding, is of rare occurrence. Sometimes there is mere paration of the above named parts; more frequently, the glenoid vity is fissured and broken up. The detached portion of the scapula retained in close contact with the head of the humerus, by the long ads of the biceps and triceps muscles; and both the fragment and e head of the humerus are displaced downwards and forwards into the illa, by the action of the subscapularis and pectoralis major, and of e other muscles connected with the upper part of the humerus. The

Fig. 155.

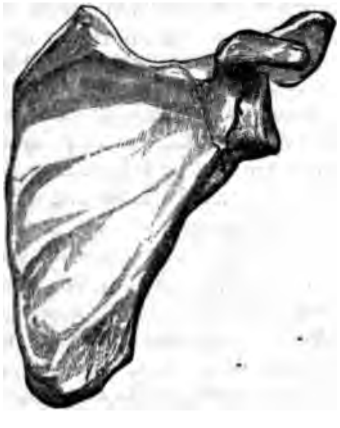
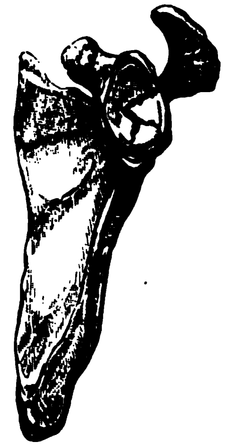


Fig. 156.



Fracture of the Glenoid Cavity, and of the Neck of the Scapula in various directions. From Fergusson.]

appearances are very like those of dislocation; there is the same flattening of the shoulder, with palpable prominence of the acromion, and vacancy beneath it; and the head of the bone may be felt plainly in the axilla; at first, too, there is no crepitation; and the limb is somewhat lengthened. But, by very gentle effort, the head of the bone may be replaced—a thing very unusual, if not actually impracticable, in dislocation. Then crepitus may be plainly felt, on rotating the arm with one hand, while with the fingers and thumb of the other, pressure is made deep in the axilla and on the coracoid process; then, too, flattening of the shoulder is made to disappear; but, on ceasing from manipulation, deformity and displacement are speedily reproduced. In treatment, a pad having been placed in the axilla, the shoulder is raised and the forearm supported by a sling.

Fracture of the Neck of the Humerus.

1. *Fracture of the Anatomical Neck.*—Occasionally the bone gives way at this point, but not so frequently as below the tubercles. The injury is the result of direct violence; and intrascapular. There is but little displacement or deformity; the lower fragment being retained in its ordinary position by the muscles inserted into the tubercles. The chief signs are pain, impairment of motion, and crepitus. Sometimes impaction takes place, the upper fragment being driven into the cancellous tissue of the lower; then the signs are unusually obscure; but the circumstance is favorable to osseous and speedy reunion. When there is no impaction, the detached head of the bone may become necrosed; and in that event inflammatory disorganization may be expected, for extrusion of the sequestrum. Treatment of this form of injury consists mainly in preserving quietude in the parts.

2. *Fracture by Separation of the Epiphysis.*—This also is the result of direct violence. The head of the bone remains in its place; while the shaft is carried forwards on the coracoid process, by the action of the muscles inserted into the bicipital ridges. There is little or no flattening of the shoulder; the head of the bone can be felt *in situ*, motionless on rotation; the end of the shaft—directed obliquely upwards and inwards—is felt and seen projecting on the coracoid process; the arm is shortened, with the elbow awkwardly projecting from the side; by slight extension and coaptation adjustment is readily effected, and then crepitus is emitted on rotation. The most characteristic sign is the remarkable prominence over the coracoid, produced by the resting of the end of the lower fragment there. Sometimes impaction, however, occurs; the lower fragment being driven into the upper; and this necessarily obscures the signs of injury.

In treating this form of fracture, a pad is placed in the axilla; by two splints of pasteboard, wood, or leather, placed one on the outside, the other on the inside of the limb, retention is secured;[1] the forearm is supported by a sling; but the elbow is left free and pendent. Were pressure to be made on the elbow, by adjustment of the sling in the ordinary way, displacement of the lower fragment would inevitably be reproduced; whereas, by following an opposite course, a certain degree of permanent extension is maintained on the humerus, which is of use in preserving apposition.

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[1] Sometimes the internal splint may be dispensed with.

3. *Fracture of the larger Tubercle.*—This is the result of direct violence. The joint is preternaturally broad; the acromion projects somewhat; the deltoid is slightly flattened; the arm is powerless as to elevation; and two hard swellings are to be felt—one internal to the coracoid process, the head of the bone—the other beneath the acromion, the detached tubercle. Treatment is as in the previous injury; with the whole forearm supported.

4. *Fracture at the Surgical Neck.*—This is also the result of direct violence. The upper fragment remains nearly in its place, moved slightly upwards and outwards by the action of the muscles inserted into the tubercles. The upper end of the lower fragment, or shaft, is drawn upwards, and close to the side by the muscles inserted into the bicipital ridges; while its lower end, at the elbow, is abducted by the action of the deltoid on its point of insertion. The appearances consequently are —no flattening of the shoulder, on the contrary rather a fulness; the head of the bone felt plainly *in situ*, motionless on rotation; the upper end of the fragmental shaft felt displaced on the side, and a depression plainly perceived at a corresponding point in the external outline of the limb; the arm shortened and powerless; the elbow abducted; crepitus, on rotation after adjustment. In treatment, a full-sized wedge-shaped pad is placed in the axilla; splints are applied along the limb, the outer one extending from the top of the shoulder to the external condyle, the inner from the internal condyle to the axilla; the forearm is supported by a sling; and again the elbow is left free and pendent.

5. *Fracture with Dislocation.*—Fracture at either neck may occur, in consequence of great and direct violence, and be accompanied with dislocation of the head of the bone. Fortunately, the combination is of exceeding rarity. The symptoms are necessarily complicated. But the diagnostic mark is sufficiently plain; the head of the bone is felt lodged in the axilla, not moving along with the shaft in rotation. On readjustment, too, characteristic crepitus may be detected. Treatment is difficult. An effort is to be made, by direct manipulation, to reduce the head of the bone if possible—of course under chloroform; and if this be accomplished, then the case, having been reduced to one of fracture, requires the ordinary retentive treatment after due coaptation. Or, failing in direct coaptation, the fracture may be reduced and arranged tightly in splints, so as to admit of reduction of the dislocation by extension being attempted in the ordinary way. But, if the luxation remain, notwithstanding every warrantable effort to remove it, then it were well to adjust the end of the shaft into the vacated glenoid cavity, and to retain it there for a time by splints, bandaging, and a pad in the axilla. The broken end becomes rounded off, assuming an articular character and function; and the new joint is likely to prove more useful, than if reunion had been effected upon the displaced fragment in the axilla.

Fracture of the Shaft of the Humerus.

1. *Below the Bicipital Ridges, and above the Insertion of the Deltoid.*

—Here the position of the fragments is the reverse of what results from solution of continuity at the surgical neck of the bone. The upper fragment is drawn inwards, to the side, by the muscles inserted into the bicipital ridges; while the lower is displaced outwards and upwards by the action of the deltoid, causing an abnormal prominence at this part of the arm—immediately above the insertion of the muscle—with an inclination of the elbow to the side. The characteristic signs are, the prominence just spoken of, shortening of the limb, crepitus on adjustment and rotation, and adduction of the elbow. Coaptation having been effected, splints are applied, a pad is arranged so as to keep the upper fragment separate from the chest, the forearm is supported, and the whole is steadied and retained by suitable bandaging.

2. *At the Middle of the Shaft.*—At this point the nature of the injury is at once made apparent, by deformity, shortening, and powerlessness of the limb, with distinct crepitus emitted on the slightest manipulation. Reduction is easily effected, by extension and coaptation; and retention is maintained by splints; the forearm being also supported by a sling.

3. *At the Shaft above the Condyles.*—Here the solution of continuity is generally oblique; sloping down from behind forwards. And the appearances simulate those of dislocation of both bones of the forearm backwards. The lower fragment is drawn upwards and backwards by the action of the biceps, triceps, and brachialis anticus. The limb is shortened; and there is much bulging posteriorly. On extending the forearm, passively, the deformity is removed; but on resumption of the flexed posture, it is instantly reproduced; and by this test the accident is sufficiently distinguished from dislocation. Crepitus may be plainly perceived, on combining coaptation with rotation. When the line of fracture follows an opposite direction, passing obliquely upwards from behind forwards, the displacement is reversed; the lower end of the upper fragment projecting behind, while the upper end of the lower fragment is drawn upwards in front. Reduction having been effected, rectangular splints are applied on the inside and outside of the limb, and are retained by bandaging; the rectangular position of the forearm being obviously advisable, in order to relax the displacing muscles—the biceps, triceps, and brachialis anticus. The splints—made of pasteboard, leather, or gutta-percha—should extend from near the middle of the arm quite to the wrist.

Diastasis may occur; separation of the epiphysis, with or without rotation. Reduction having been effected, by extension and coaptation, retention will be maintained best in the bent position.

Fracture at the Condyles of the Humerus.

1. *Of the Internal Condyle.*—The line of fracture is oblique to the shaft, detaching the internal condyle. During flexion of the forearm there is little or no displacement; but, on extension, the ulna is drawn upwards and backwards, by the action of the triceps, there being no longer any efficient resistance to the coronoid process. The signs are—crepitus, on direct lateral movement of the injured part; obvious dis-

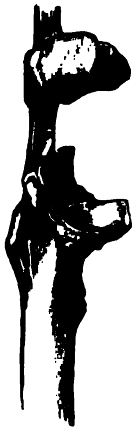
ment of the ulna in extension, and replacement of it by flexion of rearm. In treatment, the limb is arranged in a rectangular posi- as for fracture above the condyles. But from time to time it is lient to undo the apparatus, and practise passive movement of the , lest stiffening should occur.

Of the External Condyle.—There may be little or no displace- in any position of the limb. But crepitus is to be felt; more ially during rotatory movement of the hand and radius. Treat- is as in the preceding case.

Fracture of the Ulna.

Of the Olecranon.—This may be the result of direct injury, by a n the elbow; or of muscular action only, in violent and sudden ex- n of the limb. Usually, ligament as well as bone is torn; and, quently, the olecranon, detached from the shaft e ulna, is displaced upwards by the action of the s; leaving a vacant space where prominence d have been, and placing the prominence an or more above its ordinary site. Voluntary ex- on is impracticable; flexion aggravates the signs e injury. On extending the limb, the displace- is in a great measure removed; the two frag- s are brought sufficiently near for satisfactory entous union; and in treatment, therefore, it is gh to maintain the extended position, by the application of a splint on the palmar aspect of lbow-joint. Very accurate approximation, in- , is not desirable; a compact ligamentous bond ion being equally serviceable as an osseous one, nuch less liable to a second disruption. Like- the risk of excessive osseous deposit is avoided, eby the fragment might become inconveniently ylosed, on its articulating aspect, with the end of umerus.

Fig. 157.

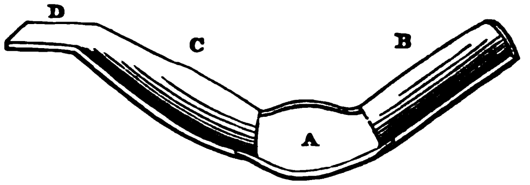


[Drawing of a Specimen, exhibiting the usual site of fracture of the olecranon, and the ligamentous union which most commonly takes place. (From Fergusson.)]

mpound fracture of the olecranon follows direct y; and is invariably to be regarded as an acci- of serious import: inasmuch as intense inflam- n of the joint is very likely to supervene. And endency to serious evil we should never lose sight of, in treatment; voring to prevent traumatic arthritis, if possible; and when it has red, doing our utmost to avert disorganization. Not unfrequently, the best care, the joint suppurates, and is with difficulty saved by ylosis. Sometimes even amputation is demanded. [In such cases, plint recommended by Mr. Mayo, and here represented (Fig. 158), be found very serviceable. It consists of two pieces of firm light rial, guttered to accommodate the limb, and connected together by a rod on each side, as may be seen in the figure, and leaving a space en them to receive the injured elbow. This connection may be ble, so as to be easily altered in its angle.]

2. *Of the Coronoid Process.*—This rare accident is more likely to follow inordinate muscular action than direct injury. The ulna is displaced backwards, by the unresisted action of the triceps; and the tendon of the biceps is rendered tense and unusually prominent by the bulging forwards of the trochlea of the humerus. The coronoid fragment is drawn upwards by the brachialis anticus. In treatment, the forearm is placed in a state of extreme flexion and retained so by bandaging, so as to relax the displacing brachialis. Ligamentous union is expected, as in the case of the olecranon.

Fig. 158.



[Mr. Mayo's Splint for Compound Fracture at the Elbow. B. The part for the upper arm. C. That for the forearm. D. Horizontal piece for the hand to rest upon. A. An intervening space for the elbow; the connecting bars curve outwards to afford more room. (From Lonsdale.)]

3. *Of the Shaft.*—The weakest point of the shaft of the ulna is a little below its centre; and there fracture is most likely to occur, from violence applied indirectly. The lower fragment is drawn to the radius, by the action of the pronator quadratus muscle; and consequently a depression is made there in the outline of the bones, until obscured by sanguineous and inflammatory swelling. There is neither pronation nor supination of the hand. By coaptation and rotation crepitus is readily perceived. In treatment, splints are applied on the palmar and dorsal aspects; each splint extending from the elbow to beyond the wrist, so as completely to command the latter articulation (*Principles*, 4th Am. Ed. p. 622). And, in order to prevent redisplacement by the pronator quadratus, a pad is placed on either aspect of the fractured part, of sufficient size to occupy the interosseous space fully, and so to offer a mechanical obstacle to undue approximation.

4. *Of the Styloid Process.*—This process may be chipped off, without other injury to the bone. There is little indication for treatment beyond rest of the part until pain and swelling have subsided.

Fracture of the Radius.

In this injury, it is convenient to observe, as an aid in diagnosis, that there is invariably abnormal pronation of the hand; whether the bone have suffered alone, or in company with the ulna.

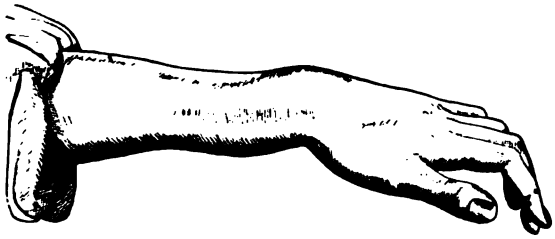
1. *At its Neck.*—This is an accident of rare occurrence, and difficult diagnosis. The fragments are but little displaced, and crepitus has to be detected through a thick cushion of muscular substance. The lower fragment is tilted forwards and inwards slightly, by the action of the biceps; the upper is rotated somewhat outwards by the supinator radii brevis. Crepitus is to be sought for by firm pressure over the site of

suspected fracture, while free rotation is made of the hand and forearm. In treatment, the forearm is flexed, and placed in the middle state between pronation and supination; long splints being applied on either aspect of the limb.

2. *Near the Centre.*—The radius very commonly gives way near its centre, from violence indirectly applied, as by falls on the hand, or by twisting of the forearm. And sometimes the accident is the result of muscular action alone. The unnatural degree of pronation is very marked and characteristic, the hand hanging awkwardly with the thumb directed downwards. The upper fragment is drawn upwards and inwards, by the action of the biceps; and there is an apparent enlargement of the upper half, with a diminution of the lower half of the forearm. The lower portion of the fractured bone is drawn towards the ulna, as well as completely pronated, by the action of the pronator quadratus. And the supinator radii longus assists powerfully, by tilting up the styloid process to which it is attached, in displacement towards the ulna. In treatment, the forearm is flexed, and placed in the middle state between pronation and supination; the interosseous pads are carefully adjusted; the long splints are applied on either aspect, projecting beyond the knuckles; the hand, bandaged separately to prevent congestion, is excluded from the retentive apparatus, and left pendent—so that by its weight it may counteract the displacing tendency of the long supinator, and separate the radius from the ulna at the point of fracture.

3. *At the Distal Extremity.*—This, too, is a very common result of falls on the hand. The radius being mainly concerned in the carpal articulation, to that bone the shock is chiefly and directly conveyed; and solution of continuity is extremely probable, more especially if any degree of twisting have been at the same time applied. The line of fracture may be either transverse or oblique. The upper fragment is displaced inwards by the pronator radii quadratus; causing an abnormal prominence on the palmar aspect, with a corresponding depression, on the dorsal. There is pronation; and, on coaptation and extension, crepitus may be detected. The hand, following displacement of the lower fragment of the radius outwards, leaves the end of the ulna unusually prominent—as if dislocated. Luxation of the carpus, indeed, is in not a few cases closely simulated. The diagnostic marks are—detection of crepitus, mobility at the injured part, and in general non-continuity of the bone as evinced on rotation. But the case becomes obscure when the line of fracture is oblique, and *impaction* has occurred. The

Fig. 159.



[Illustration of the deformity produced by fracture of the distal extremity of the Radius. (From Fergusson.)]

lower fragment having received the sharp end of the upper into its cancellated tissue, the two become locked, continuity of the bone is apparently restored, and crepitus is felt but obscurely, if at all. When in doubt, let free extension be made, such as may undo the state of impaction, and then, if fracture exist, its ordinary signs will be evinced. In treatment, it is necessary to be very careful to effect accurate coaptation by reduction; then to apply the long splints on the dorsal and palmar aspects, securing the wrist and hand against every motion. The forearm is placed in the state of easy flexion.

Lately, it has been proposed to treat this fracture without splints. The hand "having been brought into a position of strong flexion, the forearm is placed, pronated, on an oblique plane, with the carpus highest, the hand being permitted to hang freely down the perpendicular end of the plane."[1]

[In the previous American edition, Dr. Sargent thinks it "well to remind our readers that two fractures of this part of the radius have been pointed out: Colles's fracture, described by Mr. Colles, in the Edin. Med. and Surg. Journal, 1814; and Barton's fracture, described by Dr. J. R. Barton, of this city, in the Philad. Med. Examiner, vol. i, 1838. In the former, the fracture is usually transverse, and its most common seat is from three-fourths of an inch to one inch above the radio-carpal articulation (Smith on Fractures, &c., Dublin, 1850). In Barton's injury, a fragment is broken off from the margin of the articular surface of the radius, the fracture extending through the cartilaginous face of the bone and into the joint. (Med. Examiner, loc. cit.)

"The character of the deformity produced is the same in both cases, and the treatment is identical; but the prognosis, as to complete restoration of the motions of the radio-carpal joint, is probably less favorable in Barton's than in Colles's fracture, because inflammation of the joint is likely to be more severe in the former than in the latter.

"This incomplete recovery is an important matter for consideration in the history of this fracture. It is not commonly observed in young, or even middle-aged persons, if due attention is paid to the timeous and faithful performance of passive motion during the whole period of the treatment. But in elderly persons, and especially in such as suffer from chronic or subacute rheumatism, it is not at all unusual to find, at the end of the treatment, that the patient has little or no control over the wrist and finger-joints, and that this condition is permanent, with but comparatively slight improvement; and this, notwithstanding the utmost care on the part of the surgeon in preventing inflammation, making passive motion from an early period, &c. In order to counteract this difficulty, Dr. Bond, of this city, has recently contrived a splint, which allows the patient to bend the fingers and wrist pretty freely, while at the same time the fragments are kept securely in apposition and at rest, and the whole arm in a comfortable position. The splint is made of light wood, cut to the shape of the forearm, and extends from the elbow to the second joint of the fingers. To its palmar extremity is to be firmly attached, by screws or nails, a carved and rounded block of wood of the size of the patient's hand, which the latter will grasp when the arm is extended on the splint. The splint may or may not be, according to fancy or convenience, covered with binders'-board, the edges of which shall project beyond the sides of the splint, and be turned up, so as to form a kind of box for the arm. If the binders'-board be not used, the splint is wrapped, as usual, in a roller or in muslin, the arm is placed upon it, the fingers are allowed to rest comfortably, or to be moved at pleasure upon the carved block; a compress is to be placed under the arm at the point of fracture, just large enough to fill up any vacuity which the shape of the part may occasion after the fracture is reduced; another compress is to be laid on the dorsal face of the limb, opposite the first, and the arm is lightly secured to the splint by a roller. This splint is now constantly employed at the Pennsylvania Hospital, and by many surgeons in private practice, in this city, and meets with uniform approval.

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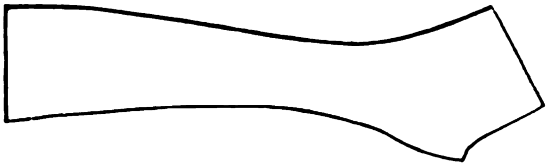
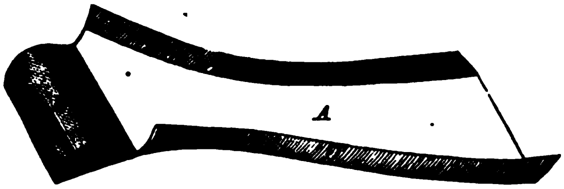
[1] Lancet, 1236, p. 487.

Fig. 160.



[Bond's Splint—the part for the forearm.]

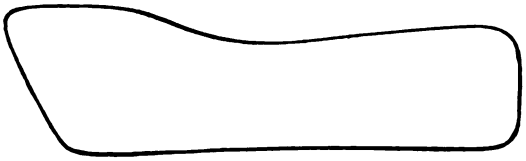
Fig. 161.



[The same, with the carved block *B*, for the hand attached, and the binders'-board, *A D*, applied to the Splint and turned up at the edges.]

"In the Am. Journal, January, 1853, Dr. Hays recommends a simplification of Dr. Bond's splint, which he has found satisfactory in practice. The splint, which was made extempore, was formed from the lid of a cigar-box (than which we may say, *en passant*, there is no better material!) by being carved somewhat to the shape of the forearm, extending from the elbow to the distal end of the metacarpus; after having been well padded with cotton, a few turns of a roller were passed around it to secure the padding; the body of the roller was then attached to the face of the palmar end of the splint, corresponding to the carved

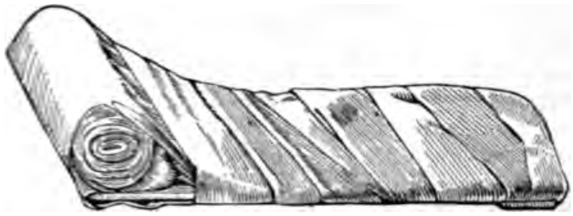
Fig. 162.



[Hays's Splint-Board.]

block of Dr. Bond's, and the apparatus was ready for use. The arm was laid upon the splint, as usual, an anterior and a posterior compress were properly arranged, and the whole was secured by a roller."]

Fig. 163.



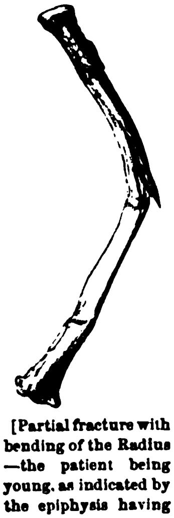
[The same, ready for use.]

Fracture of both Radius and Ulna.

This is ordinarily the result of direct violence; and the fractures consequently are at corresponding points—usually near the middle of the forearm. By the action of the pronator quadratus the hand is pronated, and the lower fragments are approximated to each other; they are also drawn upward by the combined action of the extensor and flexor muscles in the forearm, and usually project on the dorsal aspect of the limb. On extension and rotation, crepitus may be very plainly perceived. The treatment is, as for single fracture, by long splints and interosseous pads.

In young persons, both bones not unfrequently give way *at their epiphyses;* an accident which closely simulates luxation of the carpus. Like fracture of the radius alone, it is usually the result of indirect violence, by a fall on the hand. The lower fragments, with the carpus, are displaced backwards; the upper project on the palmar aspect. The latter are kept in close approximation by the pronator quadratus, while the forearm is pronated by the pronator radii teres. Considerable power is required, by extension, to undo the locking and displacement; and then crepitus is emitted on rotation. The hand usually remains in the middle state between pronation and supination. In treatment, coaptation, by efficient extension, having been accomplished, is maintained by long splints, as in the other fractures.

Fig. 164.



[Partial fracture with bending of the Radius—the patient being young, as indicated by the epiphysis having separated. (From Fergusson.)]

[In the former edition, also, Dr. Sargent introduces a brief note, with an illustration, upon *partial fracture,* which is here appended. "It happens occasionally that one or both of the bones of the forearm may be only partially broken, *i. e.,* some of the fibres of the bone are ruptured, while others are merely bent. The result is a bending of the bones; no crepitus can be felt; the restoration of the proper shape of the bone is more difficult than in ordinary cases of complete fracture, but when this has been accomplished the deformity is less apt to recur. The treatment is the same as for the ordinary fracture."

Fracture of the Metacarpal Bones.

The *Carpal* bones are seldom fractured but by great and direct force; and then the fracture is not only compound, but also generally accompanied with such injury to other parts as to call for amputation. The *Metacarpal* bones, however, not unfrequently give way—simply and remediably—by force either direct or indirect; most frequently the latter—as in violent blows delivered on the knuckles. The fragments may be made to ride, by the force which occasioned solution of continuity; and lateral displacement may be subsequently caused by action of the interosseous muscles. The swelling, pain, and powerlessness of the limb, with characteristic crepitus on manipulation, are sufficiently indicative of the nature of the injury. Coaptation is effected by extension, and is secured afterwards by splints, extending from above the wrist to beyond the tips of the fingers, on either aspect. Interosseous pads may be arranged on each side of the fractured bone, on the dorsal aspect; on the palmar, one large and suitable pad is placed, to occupy and maintain the hollow of the natural arch of the hand.

In compound injuries of this part, amputation is to be had recourse to with reluctance. When it is inevitable, let it be as partial and limited as possible, for the obvious reasons formerly stated when treating of amputation on account of disease.

Fracture of the Phalanges.

Fractures of the phalanges are usually compound. But whether compound or simple, their marks are so plain as to render mistake under any circumstances impossible. When preservation of the injured part is deemed practicable and expedient, reduction is carefully effected; and coaptation is maintained by slender splints of wood placed on the dorsal and palmar aspects.

DISLOCATIONS.

Dislocation of the Clavicle.

1. *The Sternal Extremity* may be displaced either backwards or forwards. *a. Forwards.*—Dislocation forwards is by much the more frequent; produced by force applied indirectly, through the shoulder. The dislodged extremity is seen and felt plainly resting in front of the sternum. Replacement is effected by raising the shoulder, and by carrying it backwards so as to approximate the scapulæ. Treatment is the same as for fracture of the bone, excepting the pad in the axilla, which is here unnecessary. *b. Backwards.*—Dislocation backwards is extremely rare. It has resulted from direct violence applied to the part, and also from the gradual displacement which attends on rotation and curvature of the spinal column. To effect reduction, let an assistant grasp both shoulders, and, placing his knee between, suddenly bend them backwards towards each other; while the surgeon in front pulls forward the end of the bone. For retention it is necessary to remove the shoulder from the side; and

this may be done by placing a large pad in the axilla, and binding down the lower end of the humerus. In an example dependent on spinal curvature, it was found impossible to retain the end of the bone in its proper place; and the distress occasioned by its backward pressure proved so great as to lead to extirpation of the offending part.[1]

2. *The Scapular Extremity* is not unfrequently displaced upwards on the acromion, by falls on the shoulder; the amount of deformity and inconvenience being proportioned to the degree of laceration of the confining ligaments. The shoulder is depressed; and the end of the clavicle is seen and felt rising over the spine of the scapula. Reduction is effected by elevation and retraction of the shoulder; consequently the same treatment is necessary as for fractured clavicle; but maintained with unusual accuracy, as well as for an unusual length of time—the bone being very liable to re-displacement, and consolidation of the ligamentous apparatus being apt to prove both tardy and imperfect.

Displacement of the Angle of the Scapula.

Young men, who use the arms violently in their habitual occupations, are liable to this accident. The latissimus dorsi passes beneath instead of over the lower angle of the scapula, causing unseemly projection of this, with pain and loss of function in the limb. Reduction is easily effected by direct manipulation, while the arm is much raised and brought backwards, so as to relax the muscle; and by bandaging and rest the normal relation may be maintained. On resuming the use of the arm re-displacement is very apt to occur; a circumstance of the less moment, however, as in time both power and extent of motion are almost completely regained, independently of reduction.

A more serious deformity is connected with paralysis of the rhomboid muscles, and occurs in young persons who follow constrained and sedentary avocations. Displacement of the lower angle not only takes place; but, besides, the base of the bone projects forwards, on moving the shoulder, to such an extent as almost to admit of the hand being placed between the subscapularis and the ribs. In this case, treatment must be mainly constitutional; but the attention is also directed towards restoration of tone in the faulty muscles, by galvanism, friction, and other means.

Dislocation of the Humerus at the Shoulder.

This is more likely to follow indirect than direct violence. There are varieties; three complete luxations, and two partial displacements.

1. *Dislocation downwards, into the axilla*, is the most common—indeed is regarded as the ordinary form of injury. In addition to the general signs of dislocation, there are the following: The shoulder is flattened, the deltoid having sunk inwards; an ample and evident space exists beneath the acromion, which process is unusually and strikingly prominent; the arm is slightly elongated; the elbow is abducted from the side; on elevating the limb, the head of the bone is plainly felt in the axilla—and it is found to move with the shaft in rotation; motion is

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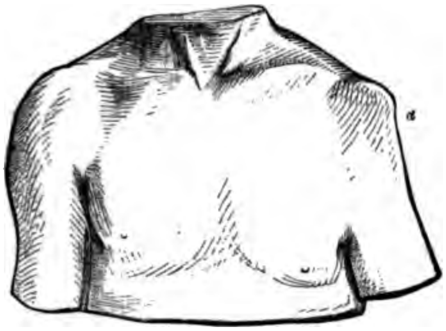
[1] A. Cooper on Dislocations, last edition, p. 354.

greatly abridged, unless when the muscular system is unusually relaxed and flabby; there is no true crepitus; pressure of the bone's head on nerves and veins in the axilla is evinced, by tingling sensations and swelling of the limb; paralysis may follow; not unfrequently the circumflex nerve has been torn across, and permanent paralysis of the deltoid has resulted.

Fig. 165.



Dislocation of the shoulder. The flattening shown at *a*. The right shoulder is normal.

Reduction may be effected, in a variety of ways; pulleys being used, or not, according to circumstances (*Principles*, 4th Am. Ed. p. 640). In all cases of difficulty, chloroform is of course employed (*Principles*, 4th Am. Ed. p. 642). *a. By rectangular extension*—the axis of extension being intended to relax the deltoid, supra-spinatus, and infra-spinatus muscles, which, according to Sir A. Cooper, are the principal opponents of reduction. And it is well to relax the biceps, also, by flexion of the forearm; the laque being attached, when required, above the elbow. The patient may be either seated or recumbent; and counter-extension is made by a broad sheet or belt passed round the chest—pressure being at the same time made on the top of the shoulder, so as to fix the scapula more completely. After extension has been duly sustained, it is suddenly slacked, and a jerking, coaptating movement is made on the head of the bone upwards; the humerus being used as a lever. When the patient is seated on a chair, much power in this way is obtained by the knee placed in the axilla, on which the humerus is, as it were, suddenly and forcibly bent. Reduction may take place suddenly, and with a snap; or gradually, and without a noise. Then the arm is secured to the side, by bandaging, and retained so for a few days.

b. By extension parallel to the axis of the body.—Thus we may succeed, single-handed, in recent or otherwise favorable cases. The patient is laid recumbent; and the surgeon places himself, sitting, by his side. Taking hold of the hand or wrist of the injured limb, the surgeon makes extension by pulling towards him; while, placing his unbooted heel in the axilla, on the head of the bone, and pushing from him, counter-extension is made, and at the same time direct reductive force is applied. Or, instead of pulling by the wrist, a laque may be fastened above the elbow; by a strap or towel attached to which, and passed behind the surgeon's back, extension may be made; leaving the hands free to rotate the flexed forearm. Care must be taken, however, that the heel's force is neither excessive, nor unduly directed; for it has happened that, failing to reduce a dislocated humerus, the operator has caused fracture of the ribs. Rupture of the axillary artery, also, with subsequent formation of false aneurism, has been caused by the heel—booted, and used rashly. Failing with the heel, the strap for producing counter-extension is placed in the axilla, and extension made steadily with pulleys, with such rotation and manipulation as seem necessary.

c. By movement upwards.—This is the method of Malgaigne. The shoulder and chest are steadied, while the arm is forcibly raised above the head; and, if need be, extension is made in that direction, with subsequent manipulation directed against the head of the bone. It is expected, however, that these latter proceedings may not be required, the bone slipping into its place during the upward movement.

Such details as to reduction apply mainly to those cases, in which from some cause or other anæsthesia is not employed. With the full effect of chloroform the muscular frame is so relaxed, that in general little else than simple extension, with coaptation, is required; it being comparatively immaterial in what direction the extension is made.

2. *Dislocation forwards, beneath the pectoral muscle.*—The head of the bone is displaced to the inside of the coracoid process, and is locked between that and the clavicle. There is the same flattening of the shoulder, with abnormal subacromial space, as in the preceding accident; but to a greater extent. There is less pain, the axillary plexus being free. Motion is more abridged. The elbow is abducted and thrown back. The head of the bone may be both seen and felt in its abnormal site. The arm is somewhat shortened. *In reduction*, the extending force is to be made downwards and backwards in a line with the body, not in a rectangular direction; in order to avoid the resistance of the coracoid process.

3. *Backwards on the dorsum of the scapula.*—This is the rarest form of complete luxation. Palpable presence of the head of the bone, in its new locality, is sufficiently diagnostic. Reduction may be effected very simply, by merely elevating the arm, and carrying the hand behind the head. Failing this the ordinary means are to be employed, as for dislocation downwards.

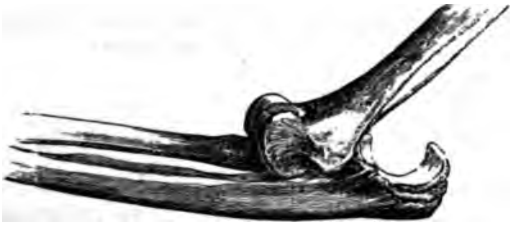
4. *Subluxation on the coracoid process.*—A partial displacement may take place in this direction. There is slight flattening of the shoulder, with a corresponding degree of vacancy beneath the acromion; and the head of the bone is felt and seen projecting on the coracoid process. Reduction is beset with no difficulty; in fact the manipulation required for diagnosis generally succeeds in effecting replacement. The accident is rare.

5. *Subluxation upwards, with displacement of the long head of the biceps.*—The long tendon of this muscle may be displaced from the bicipital groove, and laid over the lesser tubercle. In consequence, the head of the humerus escapes upwards, coming into immediate contact with the acromion. The accident is obscure, and probably rare. It is noted by the loss of power in the biceps, by pain in the seat of injury, and by the peculiar deformity attendant on the upward displacement of the head of the bone. Reduction is effected by a coaptating manipulation, directed to the tendon, during flexion of the forearm.

Dislocation of the Radius and Ulna at the Elbow.

1. *Backwards.*—Both bones of the forearm are not unfrequently displaced backwards, without fracture of any part, by falls on the hand, with the elbow in a state of semiflexion. The joint is much deformed, and has its motion greatly abridged. The hand and forearm are supine; the joint is bent nearly at a right angle, and can be neither completely flexed nor extended. The ulna and radius form a very marked projection posteriorly; and, on examination, the olecranon is found on a higher level than the external condyle of the humerus. The coronoid process of the ulna rests in the cavity which ought to receive the olecranon; and on each side of the olecranon a hollow is caused, by absence of the lower part of the triceps from its wonted locality. The trochlea of the humerus projecting forwards, forms a hard swelling behind the tendon of the biceps.

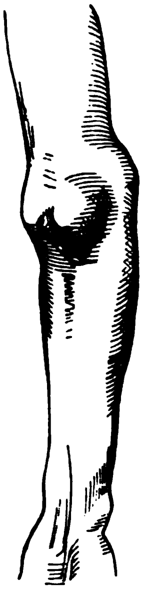
Fig. 166.



Dislocation of both bones backwards.

Reduction may be effected in two ways. *a. By extension, with coaptation, from behind.* This is the preferable mode. The patient is placed with his back to the surgeon; and, the chest having been fixed, extension is made with the arm directed completely backwards, in a rectangular relation to the trunk, so as to relax the triceps muscle. Very frequently, in recent cases, the operator thus succeeds, single-handed, by extension alone. With the left hand he makes counter-extension on the scapula, while with the right he extends from the wrist. In difficult cases, the extension is intrusted to assistants, with or without pulleys, while the surgeon conducts the direct coaptating manipulations of the joint, the patient under chloroform. *b. By forcibly bending the joint over the knee.*—The patient having been seated on a chair, the surgeon places his knee in the hollow of the elbow. Pressing the radius and ulna down upon the knee, the coronoid process is freed from the humerus, by separation; and then, on forcible yet gradual flexion, reduction is effected.

Fig. 167.



Dislocation of the elbow; showing preternatural fulness in front.

2. *Laterally.*—Both bones may be displaced laterally, as well as backwards, in two ways; to the inside or to the outside. *a. Backwards and outwards.* The coronoid process rests on the back part of the exter-

nal condyle. The ulna projects more backwards than in the ordinary dislocation. The radius forms a protuberance behind and on the outer side of the elbow, where its head may be felt plainly rotating. The inner condyle projects palpably. *b. Backwards and inwards.*—The external condyle projects. The ulna is prominent posteriorly, resting on the inner condyle, while the head of the radius is placed in the posterior fossa of the humerus. *Reduction*, in either case, may be effected as in ordinary dislocation.

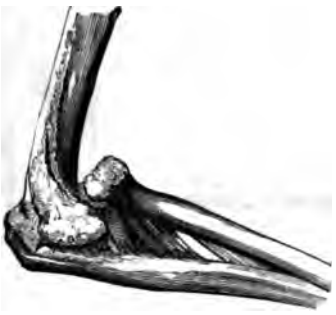
Dislocation of the Ulna at the Elbow.

The ulna may be displaced, singly, in two directions. 1. *Backwards.*—The olecranon projects behind. The forearm is much twisted inwards, with pronation of the hand. The elbow is bent nearly at right angles, flexion can be but very slightly increased, and extension is quite impracticable. *Reduction* is effected by bending the elbow over the knee, and drawing the forearm downwards. The radius proves of use, in this movement, by pushing the external condyle back upon the ulna.

2. *Backwards and inwards.*—The olecranon projects much behind, the coronoid process rests on the inner condyle, and a finger may be placed in the sigmoid cavity. The forearm is semiflexed, the hand pronated. Extension may be performed readily by the surgeon, but complete flexion is impracticable. Much pain is experienced, on account of pressure on the ulnar nerve. *Reduction* is effected by direct efforts of coaptation, during powerful and sustained extension. The accident is rare.

Dislocation of the Radius at the Elbow.

Fig. 168.



Dislocation of the radius forwards.

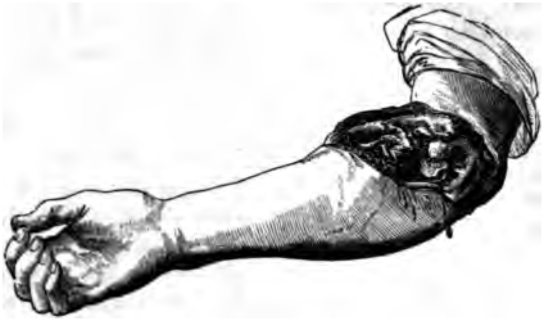
The radius may be displaced, singly, also in two directions. 1. *Forwards.*—The head of the bone rests in the hollow above the external condyle, and may be felt there. The forearm is slightly bent, and can be neither completely flexed nor extended. On attempting flexion, the head of the radius is felt to strike against the humerus, abruptly arresting the movement. The hand is inclined to pronation. *Reduction* is effected by grasping the hand firmly, performing supination, and extending the forearm steadily.

2. *Backwards.*—The head of the radius is displaced behind the external condyle, and to its outside; and in this locality it can be both seen and felt very plainly, especially on extending the limb. *Reduction* is managed as in the preceding accident; but with the hand pronated, not supine.

[*Compound Dislocation of the Elbow.*

Compound dislocation of the elbow may occur, complicated, perhaps, with fracture of the upper part of the ulna or radius, or of the condyloid portion of the humerus. In this form of injury, if the soft parts are not too seriously damaged, and the bone not too much comminuted, and if the main artery has escaped, reduction may be attempted. If this cannot be accomplished, the propriety of *resection* of the bone or bones should be considered before amputation of the arm is determined on, as in the case of compound fracture of the elbow.

Fig. 169.



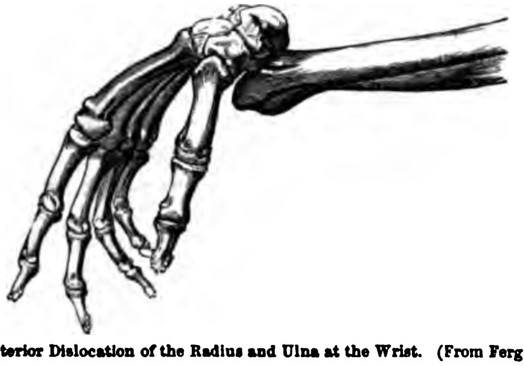
Compound Fracture of Elbow. (From Fergusson.)

In case of reduction, the wound in the soft parts should be closed as accurately as possible; lint, saturated with some adhesive material, should be placed upon it, and every effort made to procure union by the first intention. During the treatment, the arm should be maintained partially flexed, upon a properly constructed splint.]

Dislocation of the Wrist.

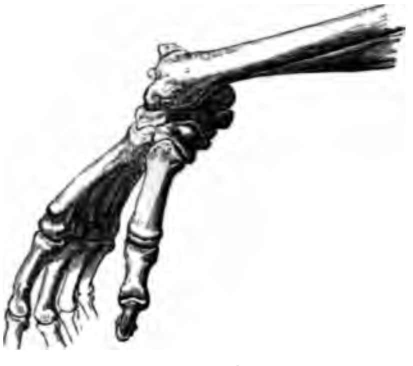
1. *Dislocation of the Radius and Ulna.*—These bones may be displaced, together, either on the dorsal or on the palmar aspect of the wrist. Falling on the palm, the two bones may be displaced forwards on the annular ligament; while, from a fall on the back of the hand, the

Fig. 170.



[The Anterior Dislocation of the Radius and Ulna at the Wrist. (From Fergusson.)]

Fig. 171.



[The Posterior Dislocation of the Radius and Ulna at the Wrist. (From Fergusson.)]

reverse movement is likely to occur. In either case, the signs are plain: a dorsal and a palmar swelling exist, composed either of the carpal bones or of the ends of the radius and ulna, as the case may be; and, by rotation and manipulation, it is ascertained that continuity in the radius and ulna is unbroken. The accident is rare; fracture of the radius being a much more common result of the same exciting cause. *Reduction* is readily effected, by extension and coaptation. And it is well to maintain retention for some time, by splints, as for fracture of the bones.

Subluxation forwards is by no means an uncommon result of falls on the palm; the bones being not only displaced towards the palm, but also separated from each other. The nature of the accident is plain, and reduction is easy. But, unless splints be carefully worn for at least a fortnight, deformity by continuance of partial displacement may scarcely be averted.

2. *Dislocation of the Radius at the Wrist.*—The distal extremity of the radius may be displaced *forwards*, separately; resting on the scaphoid bone and trapezium. The styloid process is no longer situated opposite to the latter bone; and the end of the radius may be both felt and seen projecting on the fore part of the wrist. The hand is twisted. *Reduction* is effected by simple extension and coaptation. Splints are necessary for subsequent retention.

3. *Dislocation of the Ulna.*—Dislocation of the ulna, separately, may take place *backwards;* the end of the bone projecting plainly, with twisting of the hand; and the line of the styloid process showing obvious alteration. Reduction and retention are managed as in the preceding accident.

4. *Dislocation of the Carpus.*—Complete luxation of any of the carpal bones is rare. But subluxation of the os magnum and of the cuneiform bone is occasionally met with; weakening the joint; and causing projection on the back of the wrist, during flexion. Treatment is by continued pressure and support from without, and by disuse of the part, for some considerable time.

Dislocation of the Fingers.

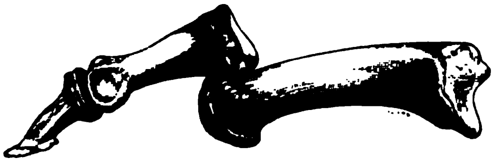
By falls sustained on the tips of the fingers, dislocation of the phalanges is sometimes produced; and the displacement is usually on the dorsal aspect. It is more common between the first and second phalanges, than between the second and third. The nature of the injury is exceedingly plain; and replacement is effected by extension and coaptation. To render extension effective, it may be necessary to affix a laque—a of tape, or the end of a silk handkerchief, or a riband—to the phalanx, by means of the clove-hitch. Sometimes the handle of a ay be used advantageously as an instrument of reduction. Splints xpedient for some days afterwards.

mpound dislocations almost always are of such severity as to demand tation.

Dislocation of the Thumb.

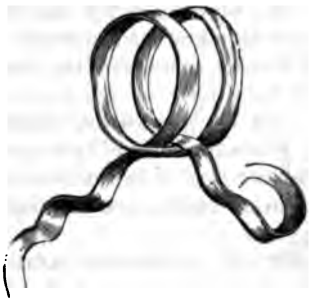
e first phalanx is not unfrequently dislocated backwards on the m of the metacarpal bone, and is reduced in general with difficulty, count of the strong lateral ligaments which oppose the retrograde nent; and also on account of the many strong muscles—eight— are connected with this part, and require to be overcome in the sion. Extension having been maintained for some time, steadily, ans of a suitable laque attached to the first phalanx, flexion is made ds the palm; and during this forced movement, slowly yet deter- lly performed, reduction is usually accomplished. It may be neces- in extreme cases, to have recourse to subcutaneous section of one er lateral ligament; but such necessity, with the use of chloro- may scarcely be expected to arise.

Fig. 172.



ication of the first phalanx of the Thumb, backwards, on the dorsum of the Metacarpus. (From Fergusson.)]

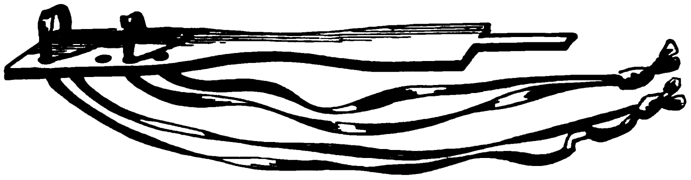
Fig. 173.



[Noose, or laque, for the purpose of making extension upon the Bone. (From Fergusson.)]

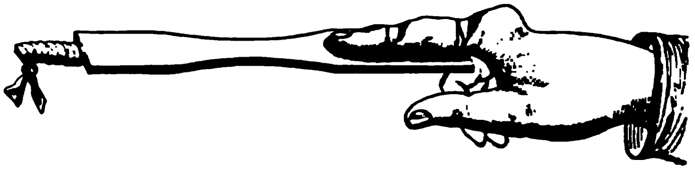
e difficulty in maintaining a secure hold of the dislocated phalanx, effecting the forcible extension usually required, is so common a e of embarrassment as to have led to various contrivances, as im- ments on the "clove-hitch" here represented. The common shoe- 's pincers have been found convenient, and may be *cautiously* em- d in an emergency, and the instrument of Blandin is admirably ed to the purpose; but, the neatest, simplest, and apparently most efficient invention, is that of Dr. R. J. Levis, of Philadelphia, exhibited in the accompanying cuts, from the Am. Jour. Med. Sci. for Jan. 1857, p. 62. In many cases, however, the dislocation may be overcome very easily, without resort to violent extension, and by manipulation only, according to the plan claimed by Dr. Crosby, of Hanover, New Hampshire, and published by Dr. Mussey, in his Report on Surgery, in Trans. of Am. Med. Assoc., 1850. By this method the displaced bone is elevated and thrown backwards until it is brought to a right or even acute angle, in its axis, with that of the bone upon the back of which it is dislocated. The fore-fingers of the operator are then crossed behind the luxated head of the upright phalanx, while his corresponding thumbs are pressed against the protruding head of the upper or horizontal shaft; then by pressure in opposite directions of fingers and thumbs at the same time, the separated articulating heads are readily restored to their proper relative positions. We have found this manœuvre much more easy and successful, than the extension method recommended in the text. It, or a similar plan, has been recently again described and advocated by Dr. Doe, of Cabot, Vermont. The principal indication is to release the flexor forming the muscular noose around the head of the metacarpal bone—which extension in a straight line is apt to render only more stringent—and to slide the projecting margins of the disarticulated heads of bone over each other, while lateral ligaments and enveloping muscles are relaxed; whereas, extension in the line of the shafts, while it tightens ligaments and muscles, is apt to lock the projecting heads still more firmly against each other.]

Fig. 174.



[Finger or thumb holder of Levis.]

Fig. 175.



[Same, as applied for use.]

Hind on Fractures, London, 1836. Lonsdale on Fractures, London, 1838. A. Cooper on Dislocations and Fractures, London, 1842. Dupuytren on Diseases and Injuries of Bones, Sydenham Society, London, 1847. Smith on Fractures in the Vicinity of Joints, &c., Dublin, 1847. Vincent, Observations on Surgical Practice, &c., London, 1847. [Malgaigne Traité des Fractures et des Luxations, Paris, 1847, 1855. Bonnet, Traité de Thérapeutique des Maladies Articulaires, Paris, 1855. Frank H. Hamilton, On Deformities after Fractures, Trans. Am. Med. Assoc., vols. 8 and 9.]

CHAPTER XXIV.

INJURIES AND DISEASES OF THE SPINE.

Concussion of the Spinal Cord.

By falls or blows, the spinal cord, like the brain, may sustain a greater or less degree of concussion; having its functions arrested or disordered, without actual lesion done to its structure. The concussion may be either general or partial. In the latter case, it is probable that the whole cord suffers, though unequally; the major effect being at and beneath the part struck—as denoted by paralysis, more or less complete, of the parts thence supplied by nerves. This paralysis is transient; passing off, in a few hours—or days; never of long duration when simple—that is, when not accompanied or followed by extravasation or effusion. As in the case of the brain, reaction may prove excessive, and inflammatory mischief may speedily supervene; attacking the cord, its membranes, or both, and ushering in a completely new train of symptoms. Or—also as in the case of the brain—the immediate results of the injury may all seem happily to pass away; and, at a remote period, an insidious chronic inflammatory process may occur, in the cord or in its membranes; causing, in the one case thickening with effusion, in the other purulent softening of slow progress.

Treatment is guided by the same principles as in concussion of the brain. Absolute quietude is enjoined; and the period of reaction is carefully watched. If it threaten to prove excessive, antiphlogistic measures are adopted, according as circumstances may seem to demand. And, for a long period after receipt of the injury, the patient must be content to use all the precautions of a prudent invalid, so as to avert if possible the insidious and formidable remote results. These, having threatened, are best met by rest and patient counter-irritation—with appropriate constitutional treatment.

Softening of the spinal cord, chronic, insidious, and intractable, is no unfrequent consequence of severe falls, or blows, upon the spine; more especially in those in the better ranks of life, who have lived hard, and indulged much in venery. The lower limbs first begin to fail, the extensor muscles proving unequal to maintain the erect posture, and the knees consequently ever and anon threatening to give way. The feet are moved oddly, and are not planted on the ground firmly, or with certainty on the spot intended; the legs are thrown outwards in stepping, and bring the feet down with a slap. The body is stooped in walking; and the line of progress is seldom a straight one. The bowels get sluggish, and the abdomen enlarges. The urine is voided with difficulty. The arms are found to be weak; and the fingers seem to be gradually freeing themselves from control of the will; there being the same uncertainty and inefficiency in doing anything with the hands and fingers, as was first observed in the lower extremities. Not unfrequently the patient is much harassed by neuralgic pains, shooting down the back and limbs, and sometimes affecting the head also. Gradually such symptoms increase; urine and fæces come to be passed involuntarily, or almost so; the use of the limbs becomes more and more feeble and uncertain; the brain at last is involved; the mind grows imbecile, as well as the body; and the patient dies often with symptoms of slow compression. The spinal cord is often found more or less affected with *ramollissement;* sometimes, however, it presents no organic lesion. But little benefit can be expected from treatment. Of heroic remedies, there is no tolerance. Indeed, the prudent practitioner contents himself with enjoining great temperance in all things; while by the employment of ordinary and simple means he seeks to palliate symptoms, and delay the fatal issue.

Compression of the Spinal Cord.

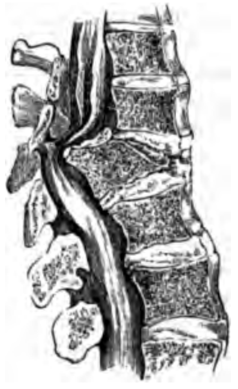
This may be caused, as in the brain, by extravasation of blood, on the surface or in the substance of the cord; by fracture and displacement of the vertebræ, producing direct pressure on the cord, with or without laceration of its substance; by inflammatory exudations and effusions exterior to the cord; or by purulent disorganization of the cord itself, the result of inflammation. Very obviously, the direct interference of operative surgery is here of no avail; the trephine is not to be thought of. Treatment consists of expectant rest, in the first instance; anxiously looking for the earliest appearance of the inflammatory process; opposing this by the suitable means, yet not heroically—knowing that in such cases active and extreme depletion is ill borne; and mitigating the symptoms connected with the paralytic state, as far as the resources of our art will allow. In the case of extravasated blood, if the immediate risk be overpassed, we may reasonably entertain expectation of a fortunate result. On the other hand, few cases of displaced fracture are wholly recovered from. And the end of inflammatory disorganization, whether chronic or acute, is almost invariably disastrous.

Fracture of the Spine.

Severe and direct violence is more likely to cause fracture than dislocation of the vertebræ; these bones being so intimately connected to each other by their articulating processes. The spinous processes alone may be broken. There is then little displacement; and the consequences are but trivial. But fracture traversing the body of the bone, making a complete solution of continuity in the spinal column at that part, is fraught with the utmost danger. Structural injury has probably been inflicted, at the same time, on the spinal cord and its membranes; extravasation of blood has taken place into the canal; probably there is displacement of the fragments, and further injury thereby done to the soft parts within. Ordinarily, therefore, the most prominent sign of spinal fracture—besides pain, swelling, mobility, crepitus, and departure from normal outline at the injured part—is paralysis of those muscles whose nervous supply proceeds from beneath the seat of injury.

According to the seat of injury, the nature of the case materially varies. When the *lumbar* region has suffered, the more prominent symptoms are—paralysis of the lower limbs, usually with loss of sensation; involuntary discharge of fæces; retention of urine; and, frequently, priapism. When the injury has occurred in the *upper dorsal*, or *lower cervical region*, in addition to these symptoms there are—paralysis of one or both arms, difficulty of breathing, sluggishness of the bowels, with distension of the abdomen. If, again, the fracture be *above the origin of the phrenic nerve*—and compression there prove great —respiration will at once cease, causing death.

Fig. 176.



Fractured spine, bisected; showing the formidable and fatal injury inflicted on the cord.

An almost invariable result of spinal fracture, wherever situated, is a deteriorated condition of the urinary organs. The kidneys err in their function; and the lining membrane of the bladder, becoming the seat of chronic congestion, assumes a most depraved condition; copious, fœtid, turbid, ammoniacal urine passes away, with sad aggravation of the general disorder of system. The bowels, too, are not merely distended and sluggish, but become depraved in the function of their mucous membrane; the dejections evincing a very vitiated character. Bed-sores are apt to form.

The symptoms, continuing and gravescent, may terminate in death; or, gradually mitigating, recovery may ensue—more or less complete. Obviously, the dangers to life are both many and formidable; inflammatory disease in the cord or membranes,—effusion, exudation, disorganization, secondary affections of the digestive and urinary organs, bed-sores, and general exhaustion. It need not excite surprise to find the average of recoveries extremely small.

The *treatment* may be reduced to simple principles. Very careful movement of the patient, and adjustment on a hard mattress, lest further displacement of the fragments occur. An equally careful reduction of the displacement which is found to exist. Retention, by adaptation of a splint—of wood, pasteboard, gutta percha, or padded iron—on each side of the spine, for some distance above and below the site of injury. Enforcement of absolute quietude, antiphlogistic regimen, and the other obvious prophylactic measures. Moderate antiphlogistics, should inflammatory symptoms exhibit themselves. Mitigation of the unpleasant results occurring in the digestive and urinary organs; obtaining regular and better movements of the bowels; relieving the bladder by the catheter, at stated and frequent intervals; and rectifying the state of the urine, by mineral acids and other medicinal means in ordinary use for that purpose. Ultimately—immediate danger having passed by—directing attention to amendment of circulation in the paralytic parts; thus preventing shrinking by atrophy, and perhaps assisting in the recovery of function. The means usually employed to fulfil the last indication are, friction, shampooing, galvanism and electricity, and the use of strychnia. Galvanism and electricity are to be used with caution, however; it being the opinion of some, that, although by means of these agents, muscular contractility may for a time be roused, yet that the amendment is in general but temporary, and that the parts ultimately lapse into a worse degree of impotency. Counter-irritation is sometimes of service.

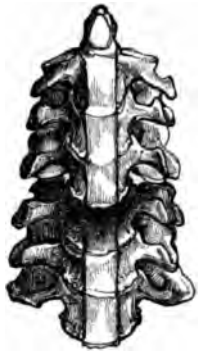
In the obviously displaced spinal fracture, with symptoms of compression of the cord, it has been proposed to employ the trephine, with the view of relieving the injured medullary matter. Reason and experience, however, have decided against the procedure; inquiry having shown that the compressing agent is usually the fore part of the body of the vertebræ, which cannot be reached and dealt with from without.

Spinal fissure may occur, without displacement; and yet may prove fatal, from another cause than concussion. Into the cleft, a portion of the membranes may be received and retained; the constriction acts as an uninterrupted exciting cause of inflammatory disease, and fatal exudation or structural change ensue. The case is obscure in its course; and is likely to be unfortunate in its issue, all remedial means proving of little avail to arrest an affection, which is being ever fed and maintained by an influence which is inaccessible and consequently insuperable.

Dislocation of the Spine.

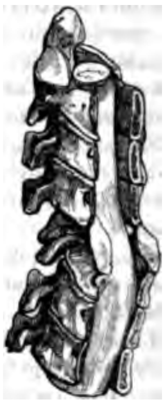
Luxation of the spine, without fracture of the processes, is a rare injury; yet has occurred, occasionally, in the cervical region—ordinarily between the fifth and sixth vertebræ. It has happened by muscular power alone; a maniac, for example, having so caused death by,

Fig. 177.



Dislocation of the spine; between the fourth and fifth cervical vertebræ. The patient fell backwards over a high paling, and alighted on his head. Cord torn. Complete paralysis. Issue fatal, within a few days.

Fig. 178.



The same; seen laterally.

ere, forcibly throwing his head from him, during restraint in a
sm of excitement. More frequently it is the result of violence
l from without; as by falls on the head. Suspension sometimes
it, but much more rarely than is generally supposed; usually
is no displacement of the vertebræ whatever, even in criminal
-death taking place from other causes.

displacement is easily recognizable on manipulation; and the
itant symptoms of compressed or torn spinal cord are sufficiently
t. If life, or the hope of life remain—replacement is to be
d by careful extension and coaptation; afterwards, untoward
are to be obviated by such management as has been advised in
e of fracture.

luxation, or partial displacement, of the vertebræ is by no means
mon; and may take place at any part of the spinal column. It
ably of most frequent occurrence in the dorsal region; caused by
on the breech, from a considerable height, with consequent forci-
ding of the trunk forwards. The posterior ligamentous apparatus
ray, to a greater or less extent, and a hiatus between the spinous
es results. The symptoms, in addition to the marks of displace-
are those of severe spinal concussion; and the subsequent dangers
o such as may be expected to follow that accident. By extension,
ment is gently effected. The same retentive apparatus is then
l as for fracture, and must be worn patiently for weeks; the
; resuming use of his lower limbs very gradually, and not till after
weeks have elapsed. Throughout the whole period of treatment,
ious regard is paid to the spinal cord; and remedial measures are
d, if necessary, to ward off disease there.

Lateral Curvature of the Spine.

ral curvature of the spine is usually held as contrasted with antero-
or curvation; the latter the result of ulcerative lesion in the
of the vertebræ, the former originally unconnected with struc-
hange. In the one there is mere change of position; in the
there is change and loss of bone, by the results of inflammatory
which has originated there. It is right to remember, however,
some cases the antero-posterior curve is found to be of the same
as the lateral displacement—originally unconnected with struc-
hange.

ral curvation may arise from different causes. And it is impor-
classify the cases accordingly; that the suitable treatment may
rded to each. 1. *Peculiar avocations* are not unfrequently the
Those, for example, which entail an habitual use of the right
uch disproportioned to that of the left; as in blacksmiths and
ns. The muscles of the right side become largely developed,
owerful; and the trapezius and rhomboids, thus changed, acting
spinal column so as to overpower their fellows of the opposite
ave the effect of gradually inducing distortion—it may be to a
rable extent. Of course, this is most likely to occur during ado-
e. The remedy is simple; partial discontinuance of the use of

the right side, with increased employment of the left. The displacement, if recent and slight, can be perfectly removed.

2. *Bad habits*, of standing, sitting, or reclining, in an awkward position, are very apt to cause a greater or less amount of lateral distortion in the young. The spinal column is habitually thrown off its normal line of erection; and, in course of time, both muscles and bones, becoming accustomed to their abnormal position, may refuse to assume any other. And thus curvature, both great and confirmed, may become established, without any actual vice in the skeleton, the muscles, or the general system. Obviously, there is one class of human beings much more than any other exposed to this form of curvature; namely, young girls occupied in the crowded details of an imprudently managed course of education. Young people of both sexes are also very liable, who are employed in sedentary occupations in trade; as in sewing, knitting, engraving, coloring, &c. The indications of treatment are plain; discontinuance of the hurtful habit or occupation; ample amount of exercise out of doors; and a voluntary use of such gymnastic or other exercises as are calculated to produce a healthful play of the general muscular system, and more especially of the muscles of the trunk and spine.[1] And by means of light articles of dress, fashioned and worn so as to attract the patient's notice to the threatened deformity, while at the same time they warn of the negligence or awkwardness which has led to it, disuse of the habits in question may be greatly favored. By some, the influence of a pulley and weight, horizontally extended on the opposite side, is made to act correctively on the curve.[2] But all cumbrous apparatus—in the shape of stays, or other machinery—are plainly to be avoided, as likely to prove most hurtful.

3. Hitherto we have spoken of simple deformity. Now we have to do with disease. *General Debility*, however induced, in the young, is a frequent cause of lateral curvature; insufficient food and clothing, excess of confinement and work, febrile or other affections leaving the system exhausted—are all causes of such debility, with its consequent injurious influence on the spine; and to these all ranks of life are subject. The muscular system grows especially weak; the extensors of the trunk are unequal to the task of duly maintaining the erect posture; and deviation from the straight line results—at first occasional, afterwards habitual, and ultimately confirmed. In the previous examples of lateral curvature—unconnected with actual disease—the curvation begins usually in the dorsal region, and is mainly situated there. But in this case, the beginning of curvation is more likely to take place in the lumbar region—at the basis of the pyramid of support. An inclination is made to either side; then, to atone for that, an opposite curve is made in the dorsal region. And, not unfrequently, there is a third ultimately established in the cervical, in a direction opposed to that of the dorsal. As the amount of bending increases, rotation at the same time generally takes place—the rotation being towards the same side as the curve; the height of the spinal column, too, greatly decreases; and, in consequence, serious changes happen to the thoracic and abdominal viscera. The ribs expand

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[1] Sir B. Brodie, Lancet, No. 1218, p. 3, *et seq.*

[2] Dr. Brown, of Boston, U. S., Lancet, No. 1329, p. 178.

on one side, while they are closed on the other; and they fall inwards, narrowing the chest in its lateral direction, and producing prominence of the sternum and of the costal cartilages. The heart and lungs become incommoded, and labor in their function. The sternum, too—with its costal appendages—has approached unusually near to the pelvis; the abdominal space is narrowed in consequence, and its organs are injuriously affected. At first, the spinal change is chiefly in the intervertebral spaces; and the deformity, at that time, is capable of being undone, by appliances from without, or partially at least, even by the efforts of the patient. But, by and by, the bones become consolidated in their new relation; interstitial absorption taking place at the compressed points, while corresponding expansion or growth occurs at those which are free; and then the deformity has become fixed and irremediable—a circumstance of very important and obvious bearing on the question of treatment.

The indications of treatment are directed fully more to the state of the general system than to the part affected. A tonic regimen is patiently persevered in; at the same time, the deficient extensors are to be roused by friction, and by suitable exercise; and from time to time, by manipulation, a restoration of the normal outline of the spine is to be attempted. To aid in the fulfilment of the last indication, a light mechanical contrivance may be occasionally employed, restorative yet not oppressive. But all cumbrous or confining apparatus, continuously worn, must prove prejudicial; the muscles, already weak, will be enfeebled more and more; and the original malady cannot fail to sustain aggravation. Good diet and clothing; regulation of the bowels; exposure to good air; judicious use of medicinal tonics; friction of the back, acting more especially on those muscles which seem most deficient; healthful exercise, both of the general body and of the muscles of the trunk—short of fatigue; and occasional attempts at readjustment by mechanical appliances—constitute the most important means towards alleviation and cure. Myotomy has been practised, both in this and in other forms of spinal distortion; but with no good result. The experience and judgment of the profession are alike opposed to it.

4. *A diseased condition of a muscle or bone, in another part*, may cause curvature of the spine. Thus, a rigid and contracted state of the sterno-cleido-mastoid muscle of one side, producing the state called Torticollis, is very apt to cause spinal curvature, as has already been noticed. The remedy is simple; by division of the offending muscle. And again, shortening of a lower limb, by morbus coxarius, or by ill-united fracture—unless atoned for by suitable mechanical contrivance—can scarcely fail to cause more or less distortion of the vertebral column.

5. *Rickets* is certainly not the least common cause. And the curvatures so occasioned are at once the most rapid and decided in their progress, and the least amenable to treatment. The peculiar characteristic is indication of the rickety state;—strumous complexion and character, and distortion of other parts of the skeleton, as well as of the spinal column (*Principles*, 4th Am. Ed. p. 411). The results of extreme spinal curvature, usually with rotation, are rapidly developed; and, at the same time, the pelvis and lower limbs, as well as the clavicles and

the superior extremities, are more or less distorted. Usually, the direction of the spinal curvature is lateral; but it may be antero-posterior. The treatment—prophylactic and curative—is conducted on the ordinary therapeutic principles (*Principles*, 4th Am. Ed. p. 415). It is here that the use of mechanical aids, in the shape of stays and belts, is not only allowable but highly necessary—when the patient is in the erect or semi-erect posture, and especially when exercise is taken; yet requiring much prudence and skill both in their first adjustment and subsequent use.

Fig. 179.

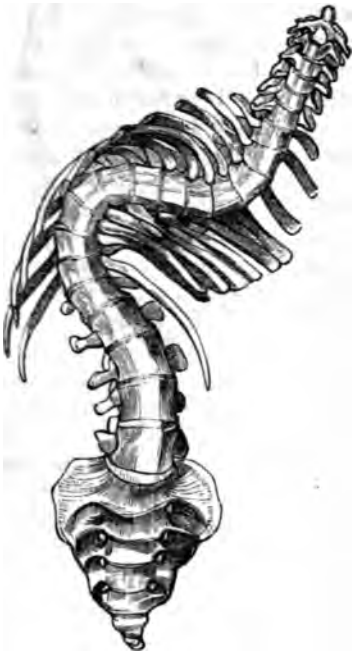
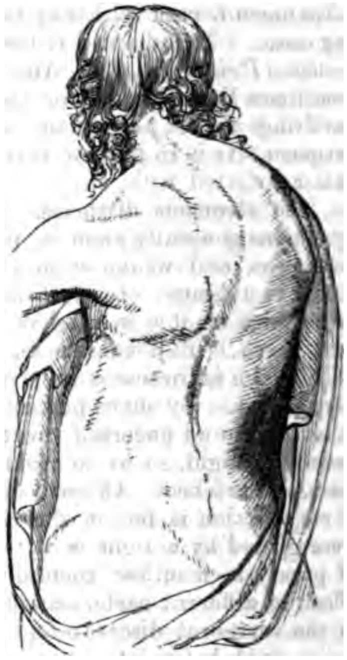


Fig. 180.



Permanent curvature of the spine, with rotation, produced by Rickets.

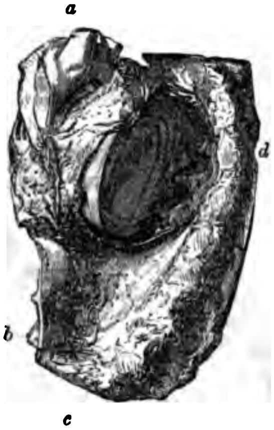
Disease of the Bodies of the Vertebræ.

Interstitial absorption frequently occurs, in connection with simple curvature, as already stated; whereby a distortion, at first remediable, becomes ultimately confirmed and unalterable. It also occurs as a primary affection, in the bodies of the vertebræ, as a prelude to carious ulceration (*Principles*, 4th Am. Ed. pp. 259, 387). More rarely, it exists as a separate and distinct disease, causing displacement by curvation forwards at the affected part; and deposit, following on absorption, after a time, confirms the curve by consolidation. Treatment is by rest and gentle counter-irritation.

Continuous Absorption and *Simple Ulceration* occur in the bodies of the vertebræ, as the results of pressure; the former often is caused by the gradual action of an aneurismal tumor; the latter may result from the more speedy operation of the same cause, and is sure to be produced by the pressure of an abscess. Healing takes place, on removal of the cause—if that be in our power.

Caries of the Vertebræ is a most formidable affection, and unfortunately not of rare occurrence. It is the ordinary cause of sharp antero-posterior curvature usually termed "angular;" sometimes attributable in its origin to external injury, but often unconnected with any assignable exciting cause. The disease follows the ordinary course (*Principles*, 4th Am. Ed. p. 383); sometimes limited to one or two bones; often involving almost the whole chain. Its most frequent site is in the dorsal region. Usually it is associated with, and probably dependent on, the strumous diathesis. Obscure spinal symptoms generally precede; pain, uneasiness, numbness, and weakness in the limbs; spasmodic twitchings; obstinate bowels; alkaline urine, with trouble in discharging it. In the part there is dull uneasiness, and ultimately pain, which is increased by pressure, and rendered intense by sharp percussion. The gait is tottering and uncertain; with the back kept peculiarly rigid, so as to avoid motion of the diseased vertebræ. Often a distressing sense of constriction is felt in the chest, as if this were girded by a tight cord. The symptoms of paralysis manifest themselves gradually; affecting different parts, according to the site of the vertebral disease; and usually motion is impaired before sensation—as can readily be understood on reference to the anatomical arrangement of the nerves given off from the spinal cord. Sharp curvature, forwards, advances more and more. The matter, in which the carious mass is bathed, accumulates; and, seeking an outlet, points at some part of the surface —directly, on the back; or at some distant point, as in the loins or groin. The ultimate result may be cure by anchylosis, in the slighter cases; the curve remaining permanent. Much more frequently, the issue is fatal; occurring rapidly, by the effects on the spinal cord; or more gradually, by hectic and exhaustion.

Fig. 181.



Continuous absorption illustrated by the pressure of an aortic aneurism on the bodies of the vertebræ; *a*, the arch of the aorta; *b*, the descending aorta; *c*, the vertebral column. Opposite *d*, the bodies of the vertebræ are seen excavated, with corresponding processes of the compressing clot; while the intervertebral substances, successfully resisting the pressure, project into corresponding depressions of the fibrine.

Treatment consists in affording absolute rest to the part, by confinement to the recumbent posture; with attention to the general health, and patient continuance of cod-liver oil. In the avowedly strumous cases there is usually an intolerance of all forms of active counter-irritation, which threaten to accelerate the fatal issue by exhaustion; and, in such patients, we are to content ourselves with rest and general management, looking gloomily to the result. In all cases, caustic issues are only serviceable at the commencement of the disease. The prone position is usually preferable to the supine; as relieving the spinal

Fig. 182.

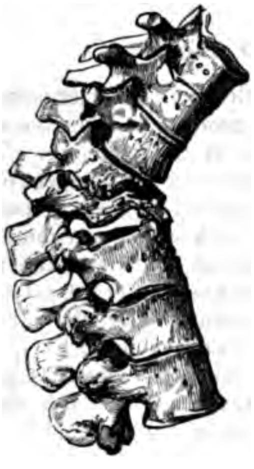


Fig. 183.

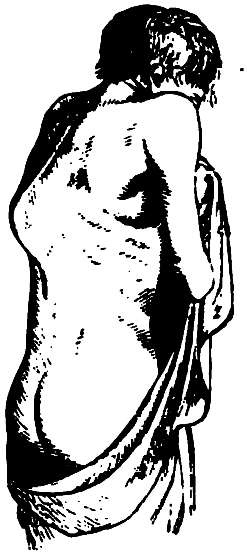
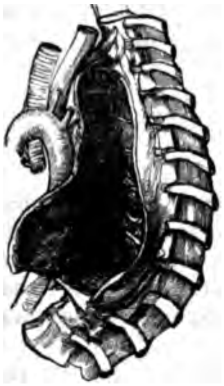


Fig. 182. Caries of the Vertebræ; macerated; the bodies extensively destroyed; marked curvation forwards.

Fig. 183. The same during life. Angulation.

Fig. 184.



Caries of the vertebræ; previously to maceration. The aorta overlays the cyst of the abscess.

column more thoroughly from the superimposed weight, and proving favorable to venous return from the bodies of the vertebræ. And "the prone couch," employed almost constantly, day and night, will be found in most cases a great assistance in the treatment; becoming, after a time, not only not irksome but absolutely agreeable to the patient; and of course so managed as to avoid, as far as possible, even the very appearance of restraint. In all cases, mechanical adjustment of the distorted spine by force is manifestly at variance with both surgery and sense.

Caries of the upper cervical vertebræ requires the most careful management: lest, by sudden motion, displacement should occur, causing fatal compression of the upper part of the cord. The patient seems to be instinctively aware of this hazard; and, on moving his head, always supports the chin carefully on the hand, while the whole body—as a pillar—is made to turn in obedience to the direction of its capital. Here mechanical contrivance is most suitable and necessary; in order to guard against sudden motion, and at the same time to relieve the diseased bones from the weight of the head. By this and counter-irritation, with due attention to the general health, cure by anchylosis is to be sought for. And though in no case our hope need be sanguine, neither in any need it give place to despair; seeing that our museums show cures by anchylosis under circumstances the most unfavorable—the spinal cord having accommodated itself to great displacement, as well as loss of substance, affecting even the atlas and dentata.

Lumbar and Psoas Abscess.

By *Lumbar Abscess* is understood, a collection of matter pointing somewhere in the lumbar region. It may originate wholly in the soft parts. More frequently it is the result of caries of the vertebræ. Treatment depends on the nature of the case. If there be not prospect of ultimate cure, no opening should be made; the ordinary palliatives are to be administered, and every care is to be taken to keep the integuments entire. If the case present a favorable aspect, on the contrary—the amount of disease in the spine seeming slight, and the system yet tolerably robust—a free evacuation should be made by puncture. By the inflammatory disintegration following on such opening, we are most likely to obtain such spontaneous change in the state of the bone, as will admit of the healing process (*Principles*, 4th Am. Ed. p. 386). But the process requires an anxious watchfulness, lest it involve the system in a dangerous amount of disturbance, and lest, also, by, excess, it prove prejudicial to the affected part. If a case present itself, in all local respects promising, but with the system accidentally low, the opening should be delayed until, by time and suitable management, the constitutional powers have been somewhat restored, and a tolerance of the remedy regained.

When the matter connected with vertebral disease points in the groin, having descended along the course of the psoas muscle, the affection is termed *Psoas Abscess;* but it, too, may occasionally be found unconnected with disease of bone. Treatment is the same as in the former instance. Under care, cod-liver oil, and the prone couch, sometimes wonderful recoveries take place; even after long-continued discharge.

Spina Bifida, or Hydrorachitis.

This is a congenital malformation, usually situated in the lumbar region; but it may be in the dorsal or sacral. The posterior part of one or more vertebræ is deficient; and, in consequence, the membranes of the cord protrude, constituting a tumor of greater or less size—composed of the ordinary integuments, the changed spinal membranes, and the spinal fluid secreted in excess. In other respects, the child may be fully and well formed. More frequently, it is otherwise defective; the lower limbs, especially, being shrunk and paralytic. Usually the tumor enlarges, by accumulation of the contained fluid; the integument thins and ulcerates; the fluid contents escape and the tumor collapses; an asthenic inflammation seizes on the spinal cord and its membranes; and the patient perishes, either directly in consequence, or by hectic. In the more favorable cases, the tumor may enlarge slowly, if at all; and the child's growth may advance uninterruptedly. Sometimes, by spontaneous ulceration, a very minute aperture is formed, through which the fluid contents slowly drain away, the tumor gradually shrinking, and the parts becoming satisfactorily consolidated.

Curative treatment is attempted only in those cases which afford a reasonable prospect of successful issue. In some cases, it is enough to palliate and prevent increase. In others, we get rid of the swelling, hoping that the fissure in the spinal column may close; or, at all events, that such consolidation shall take place as may effectually prevent recurrence of the protrusion. 1. By steady and uniform support and pressure from without, not only is increase prevented; absorption may also be occasioned; and the tumor having become slowly discussed, an opportunity may be thus given for closure of the vertebral hiatus. 2. Along with the use of pressure, occasional puncturing of the cyst may be practised, so as to expedite the process. 3. The fluid may be at once drawn off with a trocar and canula. And it has been further proposed subsequently to inject iodine, as for hydrocele. 4. By including the prominence of the tumor in two elliptical incisions, which penetrate the whole thickness of its coverings, the fluid is at once evacuated; and then, on bringing and retaining the margins of the wound in contact by means of suture, such a degree and kind of retraction is made upon the parts beneath as may favor, very much, the desired closure of the final fissure.[1] In dissecting away the part included in the elliptical incisions, care must be taken to injure the nervous expansions on its internal aspect as little as possible. The head, too, should not be kept high; otherwise the fluid of the sheath is apt to escape too suddenly. This last operation is warrantable only in those cases in which the fissure is slight, and other circumstances are favorable. After such a proceeding, as well as in the modes of treatment by puncture, obviously there is much danger by inflammatory seizure of the spinal contents—which has to be guarded against accordingly.

Malignant Disease.

The spinal column has occasionally been found affected by malignant tumor;[2] an affection which is fortunately rare, seeing that in all cases it must be quite incurable.

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[1] Dubourg, Gazette Médicale de Paris, Juillet 31, 1841; and Brit. and For. Rev. No. 24, p. 547.

[2] Medico-Chirurgical Transact. vol. vi, art. 6.

Shaw on Distortions of the Spine, Lond. 1823 and 1825. C. Bell on Injuries of the Spine, Lond. 1824. Lawrence on Dislocations of the Vertebræ, Med. Chir. Trans. vol. xiii, 1825. Teale on Neuralgic Diseases, Lond. 1829. Beale, a Treatise on Deformities, &c. Lond. 1830. Stafford on Injuries, Diseases, and Distortions of the Spine, Lond. 1832. Brodie on Injuries of the Spinal Cord, Med. Chir. Trans. vol. xx, 1837. Guerin, Gazette Médicale, 1840, Nos. 14 and 15. Hewitt, Cases of Spina Bifida, Lond. Med. Gazette, vol. xxxiv, 1844. Lonsdale on Curvature of the Spine, Lond. 1847. Stanley on Diseases of the Bones, Lond. 1849. Bishop on Deformities of the Human Body, Lond. 1851. Tamplin on Lateral Curvature of the Spine, Lond. 1852. Pirrie, Principles and Practice of Surgery, Lond, 1852. Brodie on Injuries of the Spinal Cord, Med. Chir. Trans. vol. xxi. Brodie on Curvatures of the Spine, Lancet, No. 1218, *et seq.*

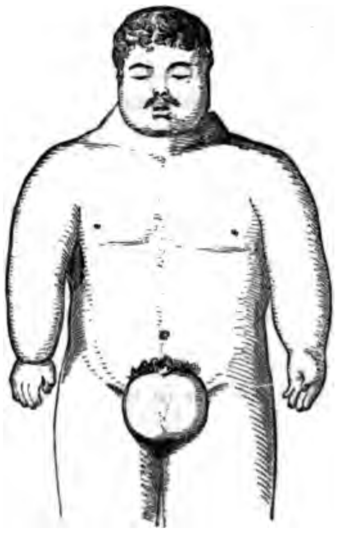
CHAPTER XXV.

INJURIES AND DISEASES OF THE CHEST.

Fracture of the Ribs.

are very liable to fracture; by a blow, or fall, or the appli-
rushing weight; and the ordinary site of injury is near the
he bones. The signs are, pain at the part, usually with dis-
and swelling; difficult breathing; full inspiration imprac-
e attempt causing great aggravation of pain, with sudden
the breath; crepitus felt, when the palm is held over the
g respiratory movement. Displacement is seldom great; and
always inwards. The injury
npound, with corresponding
he integuments. More fre-
s in a manner compound, by
oth pleuræ, and consequent
ion with the lung, the integu-
aining entire. Under such
es, emphysema can scarcely
r, to a greater or less extent;
g outwardly from the lung,
ing infiltrated into the sub-
reolar tissue—puffing up the
he chest, and probably also ex-
the neck. Inflammatory
the pleura is not unlikely to
as can readily be understood.
cts of treatment are, to effect
in replacement, to prevent
d to avert inflammatory or
ward consequences. A com-
l along the sternum, so as to
surface equally salient with
ridge of the vertebræ; and
ad flannel roller is applied
d the chest; the effect of such deligation being to arrest
movement of the ribs, and to force outwards the fragments
r ribs—not only placing them in more accurate contact than
rise would be, but also removing their sharp extremities from
which they might seriously injure. In severe cases, when

Fig. 185.



General emphysema of the whole surface, after wound of the right side of the chest. After Larrey.

the cavity of the pleura contains much extravasated blood, bandaging must be conducted with great caution, lest it seriously aggravate the already existing dyspnœa. [Under these circumstances, the bandage of adhesive strips, applied only on the injured side, so as to support that side without producing any circular constriction, is vastly preferable. The mode of applying these strips is sufficiently obvious. This dressing was first resorted to, we believe, in one of the London hospitals. It has been found to answer well for most cases, and is often a great improve-on the old-fashioned bandage.] Rigid antiphlogistic regimen is enjoined; and active antiphlogistics are not delayed, if inflammatory accession threaten in the chest. Cough, sneezing, and other involuntary movements of the part, should be avoided, if possible; and confinement to bed is expedient, during the first few days. The bandaging is likely to limit or prevent emphysema; but if this prove excessive and inconvenient, relief may be obtained by punctures. Ordinarily, it does not occur to a great extent, and gradually disappears, probably by absorption.

Dislocation of the Ribs.

Sometimes, but rarely, the head of the rib is displaced from its connection with the spinal column, without fracture. Displacement is usually slight. And the injury resembles fracture very closely, both in its history and treatment.

Fracture of the Sternum.

The sternum is sometimes broken by direct violence, and displaced inwards. The signs are plain; deformity by displacement being at once discernible, and crepitus taking place during respiratory movement. Treatment is as for broken ribs; but without any compress over the broken bone. And there is the same necessity for watchful anxiety as to the state of the thoracic contents.

Caries and Necrosis of the Ribs and Sternum.

These bones are liable to caries and necrosis, in connection with injury, and as results of mercurial poison—with or without syphilis. The ordinary treatment has to be put in force; except in those cases of chronic caries in which the disease is slight, and has been of very long duration, in a feeble system. Then, sudden suppression of the discharge, by healing, would be apt to prove injurious; and it is well to be contented with mere palliation. In cases, too, where the affection of bone is secondary to suppurative disease of the chest, all heroics directed against the caries or necrosis must be abstained from. The external disease is but a sign and sequence of an internal and much more important disorder.

When operation on a diseased rib is necessary, freedom of manipulation is favored by the previous condensation and thickening of those parts which lie between the bone and the pleural cavity.

Hernia of the Lungs, or Pneumocele.

This malposition may be: 1. *Congenital*, from defective development of the thoracic parietes; 2. *Traumatic*, a wound having left a portion of the parietes open to protrusion; 3. *Consecutive*, following fracture of a rib, or perforation of the chest's wall by abscess; 4. *Spontaneous*, protrusion taking place through an intercostal space, during the exertion of coughing, or through the natural apertures at the root of the neck beside the large bloodvessels. The intercostal spaces most frequently affected are the seventh, eighth, and ninth, at their anterior part.

When slowly formed, the protruded part acquires a sac from the pleura costalis; and, from a small beginning, may come to be of great size—its dimensions greatest during forcible expiration. Auscultation reveals nothing in inspiration; but during forced expiration an intense vesicular murmur is heard, similar to that of normal inspiration, and sometimes accompanied by a kind of crepitant *râle*. At the same time, too, an impulse is given to the hand, and the "vesicular rustling" may be felt as well as heard.

In the traumatic form, reduction is to be effected, if the protruded portion of lung be in a fit state for replacement. Otherwise, it is to be removed by incision. If left to itself, the part will sphacelate, and spontaneous cure may result. No real strangulation, however, occurs; and on this account prognosis is more favorable than in abdominal hernia.

In the other forms, the tumor is reduced, and a firm compress and bandage continuously worn.[1]

Wounds of the Chest.

These may be inflicted by the thrust of a sharp instrument, by the penetration of obtuse bodies, by gunshot, or by fractured rib. Danger is great both at once and secondarily; immediately, by loss of blood, and by entrance of air into the pleural cavity; subsequently, by inflammation, and its results. The latter danger is the more serious. And the general statement may safely be made, that in the early treatment active antiphlogistics are mainly to be trusted to; unless decidedly contra-indicated by special circumstances of the case. Penetrating wounds by sharp instruments, affecting the lungs, are always formidable by bleeding. But in the case of an obtuse body penetrating, the elasticity of the lung saves that tissue from injury, which, from a sharp-pointed body, it could not fail to sustain.

1. *Wounds of the Pleura Costalis.*—If the intercostal artery have been wounded, bleeding is likely to be troublesome. The loss may be excessive through the external wound; or blood, accumulating within the pleural cavity, may compress the lung, and constitute a dangerous hæmato-thorax. This point, therefore, should engage our first attention. And to secure the vessel, one of two methods may be adopted. It and its accompanying rib may be included in the noose of a ligature. Or, a linen bandage having been placed over the part, a fold of it is pushed into the wound, between the ribs; and the linen pouch within the pleural cavity is crammed with charpie, by means of a probe or director; then,

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[1] *Vide* M. Morell-Lavalée, Mém. de la Soc. de Chirurg. de Paris, 1847; and Brit. and For. Med. Chir. Rev. Jan. 1848, p. 133.

tightening the bandage, and securing it firmly round the chest, this internal plug is made to compress the vessel and occlude its orifice. But, indeed, the dangers by wound of this vessel seem to have been somewhat overstated; and in most cases ordinary hæmastatics, it is probable, will not be found to fail.[1]

Entrance of air by the wound, and accumulation of it within the chest, are to be avoided by early and accurate closure of the wound. Otherwise, the condition of pneumothorax becomes established; the lung is compressed, and made to collapse; respiration is consequently rendered imperfect; and the other lung, having suddenly a great amount of additional duty thrown upon it, labors in its function, becomes dangerously congested, may prove apoplectic, or is attacked by violent inflammation. These immediate dangers having been surpassed, others remain. The wound, suppurating, may lead to inflammatory affection of the pleura or of the lungs, by extension of the inflammatory process; and this has to be guarded against by antiphlogistic regimen, in the first instance, followed, if need be, by venesection and antimony.

2. *Wounds of both Pleuræ and of the Lung.*—The dangers are still by blood, air, and inflammation. There is now a third outlet for the first; by the bronchial tubes, as well as into the pleural cavity, and through the external wound. And the bleeding, coming from so vascular an organ as the lung, is likely to prove formidable. The usual signs of wound of the lung are—a state of system bordering on collapse, difficult breathing, great anxiety of countenance, and expectoration of florid arterial blood. Bleeding is dangerous, by direct loss, and by danger of hæmatothorax; and also by risk of accumulation in the bronchial tubes, or in the trachea, during the stage of collapse. Afterwards comes the peril of intense inflammation in lung and pleura. And, lastly, by profuse and continued discharge from the suppurating wound, the patient may perish under the symptoms of phthisical hectic. The first danger is met by rest, quietude, and rigid antiphlogistic regimen; recourse being had also, if need be, to more direct means of controlling the hemorrhage—derivative venesection, nauseants, acetate of lead, and opium, &c. (*Principles*, 4th Am. Ed. p. 321). Rallying and reaction having occurred, antiphlogistics come into use, and often not sparingly. Hectic having threatened or set in, a corresponding change must be made in the treatment. The local management is simple throughout. At first careful examination of the wound is made, in order that no foreign matter may be permitted to remain. Then it is covered by tepid water-dressing, retained by light bandaging. And the patient is laid, and directed to remain, on the wounded side, so as to favor outward escape of discharge; while by this posture, also, adhesion is favored between the corresponding wounded portions of the two pleuræ, so as to shut off the injured part from the general costal cavity.[2] When contusion exists, as in gunshot injuries, great watchfulness is necessary at the time of the separation of sloughs, lest secondary hemorrhage occur. Small doses of aconite are of use in averting this; by subduing the febrile excitement of the circulation which usually precedes. Emphy-

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[1] Guthrie on Wounds of the Chest, p. 104.

[2] Ibid. p. 63.

sema may occur in one of two ways; but is seldom such as to require direct treatment. Air, escaping from the pulmonic lesion, may not be wholly discharged externally; or, in a valvular form of external wound, air may enter more readily in inspiration than it can escape during expiration; and, in either case, a portion is liable to be infiltrated into the subcutaneous areolar tissue.

Hæmatothorax.

This term denotes an accumulation of blood in the pleural cavity, causing compression of the corresponding lung, and the dangerous consequences of this, already noticed. It may be produced by spontaneous escape of blood, through ulceration—as in aneurism; much more frequently it is of traumatic origin—by wound of the lung, or of an intercostal artery. It may be either simple or compound; the latter, if the result of a penetrating wound; the former, if caused by puncture of the lung in a case of fractured rib with much displacement of the sharp ends of the bone—the integument remaining entire. According to the extent of accumulation, respiration is more or less oppressed; there is dulness on percussion on that side, and no respiratory murmur can be heard; on the opposite side, respiration is *puerile;* the patient lies only on the affected side, and the corresponding chest has often been observed of a purple color; the countenance is anxious; the general surface is cold, pale, and bedewed by clammy sweat; and there is feeble pulse, with cold extremities, and other signs of serious loss of blood (*Principles*, 4th Am. Ed. p. 326).

If the affection be not compound, and slight in other respects, treatment is analogous to that of sanguineous collections in the external parts of the body, following bruise. Wound of the surface is carefully abstained from, and gradual disappearance by absorption patiently awaited (*Principles*, 4th Am. Ed. p. 652). Venesection is advisable, unless when specially contraindicated; first, to arrest bleeding, and so to limit the accumulation; secondly, to diminish the amount of circulating fluid in the laboring sound lung, and at the same time to avert or mitigate inflammatory disease in all the injured parts. If, however, the accumulation be obviously great—as evidenced by the amount of dulness and fulness of the side, and by the oppression in breathing—it becomes necessary to afford the confined blood means of escape, by making a suitable opening in the parietes.

In the compound form, the wound is kept open; means are taken to arrest the bleeding at its source, and at the same time to assist the respiration; and inflammatory symptoms are timeously opposed.

Pneumothorax.

This denotes accumulation of air in the pleural cavity. The case may be either medical or surgical; the latter dependent on wound of the lung; the former caused by perforating ulcer, connected with tubercular abscess. The traumatic form is the result of penetrating wound, oblique and valvular; or of fractured rib, displaced, inwards. It has also remitted from some wound of the chest; the lung and pleura pulmonalis having given way by rupture. The signs are: absence of the respiratory murmur on the affected side, with a peculiarly clear resonance on percussion; the ribs are fixed; and, on the opposite side, respiration is puerile, as in the preceding affection. In the medical form, there is usually fluid as well as air in the chest; consequently a splashing of this fluid is heard on succussion; and coughing produces a ringing sound, termed metallic, or amphoric resonance.

Treatment consists in affording ease to the working lung, and averting inflammation. Judicious loss of blood, as already seen, conduces powerfully to both objects. In urgent cases, an outward escape is to be afforded to the air, by acupuncture, or by the thrust of a small trocar and canula.

Emphysema sometimes coexists with pneumothorax. It has been already considered, incidentally.

Paracentesis Thoracis.

Puncture of the thoracic parietes may be required, we have seen, on account of accumulated air or blood in the pleural cavity. It may also be called for in consequence of fluids having collected there—the result of inflammatory disease—Hydrothorax and Empyema; affections which belong to the department of the physician, and which it is consequently unnecessary to consider here. In empyema, the side is found dull on percussion and swollen, and the ribs are unusually separate; there are dyspnoea, difficulty of lying on the sound side, and the other signs of pleural accumulation already noticed; the side enlarges more and more; fluctuation comes to be discernible in the intercostal spaces; and ultimately, by ulceration at the most prominent part, spontaneous evacuation may take place, as in ordinary abscess.

For the discharge of purulent and sero-purulent fluids, an opening is made by means of a trocar and canula. This instrument may be employed subintegumentally, as in the case of chronic abscess (*Principles*, 4th Am. Ed. p. 195). Or the opening may be made direct, and left patulous and dependent. However made, the margins of the ribs should be carefully avoided—especially the lower—lest wound of the intercostal arteries occur. In the direct puncture, it is well to make an incision through the skin and muscular stratum, by means of a scalpel; merely completing perforation by the trocar. As to the most eligible point for making such a wound, authorities greatly differ. The opening must be dependent, and sufficient in all respects for evacuation; and yet it must not be so placed as to endanger the diaphragm—though this muscle, it is to be remembered, is usually displaced downwards very considerably by the accumulation, and is further protected by the patient being directed to inspire during the act of puncture. The space between the fifth and sixth ribs is frequently chosen, midway between the spine and sternum. Some prefer that between the seventh and eighth; others operate between the sixth and seventh. Some go as high as between the fourth and fifth ribs, having observed that natural pointing not unfrequently takes place there. Of late, the space between the sixth and seventh, or that between the seventh and eighth, has been opened, by cautious dissection and the thrust of a small trocar, at the most dependent part—below the lower angle of the scapula. The patient is placed with his side prominent and dependent; and arrangements are made for turning him on his face, should oppressed respiration ensue. In the case of direct opening, permanency may seem preferable to closure and re-opening; and this is secured by suitable dressing of the wound. To favor discharge, the patient remains recumbent on the affected side. If closure be attempted, the greatest care must be taken to avoid the entrance of air; the patient is exhorted to shallow breathing; the canula is withdrawn before all the fluid has escaped; and the wound is instantly shut up.

The physical signs of hydrothorax are not dissimilar from those of empyema. And often very marked benefit may be derived from paracentesis. Accumulation having proceeded so far as greatly to embarrass breathing, the patient is arranged as already described, and by means of a *small* trocar the serum is cautiously withdrawn; the utmost care being taken to prevent entrance of air into the pleural cavity. Enough having been removed, the puncture is treated so as to secure immediate union. And, subsequently, the operation may be repeated, if necessary. Relief is certain, for the time: and in not a few cases this adaptation of surgery to medicine seems to have been instrumental towards a permanent cure.

Wounds of the Heart.

They generally prove fatal; but not necessarily so; and therefore are amenable to the general principles of treatment formerly detailed.

Hennen, Military Surgery, Edin. 1820. Mayer, Tractatus de Vulneribus Pectoris, &c. Heidelb. 1823. Quesnay, Dissertatio de Hæmorrhagia Arteriæ Intercostalis Sistenda, Berol. 1823. Larrey, Mémoires de Chir. Militaire, vol. ii, and Mémoires de l'Acad. Royale de Médecine, Paris, 1828. De Jong, Diss. de Vulneribus Cordis, Groning, 1838. Guthrie on Wounds and Injuries of the Chest, Lond. 1848. Richerand, Nosog. Chirurg. vol. iv, p. 3. Dict. des Sciences, Méd. vol. iv, p. 217. Dupuytren, Leçons Orales, vol. ii Cock and Hughes on Paracentesis Thoracis, Guy's Hospital Reports, Second Series, No. iii, Lond. 1844. [W. Pepper, Cases of Empyema, Am. Jour. Jan. 1852. H. J. Bowditch, On Pleuritic Effusions, and on Paracentesis Thoracis, in Am. Jour. Med. Sci. April, 1852; also in Am. Med. Monthly of New York, vol. i, pp. 7 and 92, 1854.]

In regard to Injuries of the Chest, much valuable information will be found in Guthrie's Commentary on the Surgery of the War, London, 1853.

CHAPTER XXVI.

AFFECTIONS OF THE MAMMA AND MAMMILLA.

Irritable Mamma.

The female breast is not unfrequently the seat of Irritation (*Principles*, 4th Am. Ed. p. 75); giving rise to much local uneasiness, and tending also to involve the system in serious disorder. The gland is nowise altered in structure; sometimes there is slight puffiness in the superficial areolar tissue. The pain is very considerable; not constant, liable to exacerbations—often periodic—and otherwise evincing the ordinary characters of neuralgia. Aggravation generally occurs at the menstrual period. The patient is young or of middle age; and usually is pale, thin, and cachectic.

The affection is to be considered as symptomatic of more serious disease, and treated accordingly. In the majority of cases, the uterus is to blame—disordered either in structure or in function; and until this source of evil be rectified, all other treatment will prove of little avail. In cases of functional derangement, the preparations of iron are indicated. Conium is of service in allaying the general irritation of system. Locally the endermic use of nitrate of silver, so as merely to blacken, often affords relief; and belladonna, aconite, and prussic acid may be used in the form of ointment, liniment, or plaster. Change of air, exercise, attention to diet, and the other ordinary correctives of chronic disease, are of great importance. In some cases the symptoms seem dependent on neuromatous formation in the neighborhood of the gland; and, under such circumstances, cure may be readily effected by excision of the superficial tumor.

Mammitis.

1. *Acute.*—Acute inflammation in the mamma may result from external injury, exposure to cold, or any of the other ordinary excitants; most commonly it is connected with lactation. The pain and other local signs are intense; fever is proportionally severe; and suppuration is from the first imminent. The secretion of milk is first perverted, and then arrested. Matter, when formed, is seldom limited to one part, pointing rapidly there; but rather tends to pervade the whole gland, pointing slowly; and the abscess, after having become open, is liable to degenerate into the condition of sinus (*Principles*, 4th Am. Ed. p. 197).

In the outset, leeches are applied in abundance, with hot fomentation; and the gland is carefully supported by a soft handkerchief or shawl, passed beneath it and round the neck. Small doses of sulphate of magnesia, in acidulated solution, assist antimony in subduing the febrile state, and at the same time have the salutary effect of opposing determination of blood and consequent hypersecretion, in the gland. When resolution is about to take place, this may be accelerated by gentle friction. When matter has formed, early evacuation should be made; for thus only may future severities by incision be prevented. In severe or neglected cases, the gland may be, as it were, dissected out by the matter separating its component parts; or many sinuses may form, communicating with each other, intersecting the whole mamma, and mixed up with intercurrent abscess. Such sinuses do not require to be each incised throughout its whole extent—the knife following mercilessly on the probe; it is enough to secure satisfactory evacuation by suitable counter-opening, and then by pressure to favor contraction of the cavities. In this we generally succeed; and continuance of the pressure is further useful, in promoting discussion of the morbid parenchyma in which the sinuses are placed. It may be applied by bandaging, by careful application of strips of adhesive plaster, or by means of air or water contained in caoutchouc tissue, as recommended by Mr. Arnott.

2. *Chronic.*—The mamma is subject to enlargement and induration, by reason of a slow, painless, and minor amount of the inflammatory process. The whole gland may be affected, or only a part. Young adults are most liable. The swelling is more diffuse than any form of genuine tumor; and is little painful, even on manipulation; it feels as if composed of numerous small granules, and has the negative character of wanting the local and constitutional signs of carcinoma. Treatment consists, locally, in light antiphlogistics, followed perseveringly by discutients; constitutionally, in attention to the general health, and to the uterine functions, by alteratives, tonics, &c.

Galactirrhœa.—By this term is understood a persistent and excessive secretion of milk; whereby emaciation, debility, and even hectic may be induced. To arrest and remove this condition, iodine given internally seems to possess almost a specific power; suckling being of course desisted from, and the uterine functions restored.

Chronic Abscess.

Chronic abscess is not unfrequently found of a somewhat peculiar character in connection with this gland; consisting of a firm cyst, containing a small quantity of thick, creamy-looking pus; existing for months or years, and enlarging slowly if at all; situate sometimes in the gland, more frequently beneath it; firm, because tense, to the touch; and sometimes closely simulating a solid tumor. It may be treated either by subintegumental or by direct puncture; or an error of diagnosis having been committed, and a free incision having been made, the cyst may be dissected away—as if a tumor.

Lacteal Tumor.

One or more of the lacteal tubes are liable to distension, by occlusion of their orifices; giving rise to a swelling analogous to ranula in its formation. The contents are milky during lactation; at other times serous and fluid, or caseous and solid—or partly so. The swelling has a fluctuating feel, and extends, radius like, from the nipple outwards; often it is of a conical form, the apex towards the centre. Treatment is by puncture, near the nipple; keeping the opening pervious. Should inflammatory change take place, inducing obliteration, the occurrence need not be greatly deplored.[1] Sometimes abscess forms; requiring the ordinary treatment.

Hypertrophy.

The mamma is liable to hypertrophy, at the period of puberty; usually with an unsatisfactory condition of the menstrual secretion. Sometimes a state resembling nymphomania attends. The undue amount of development may usually be got rid of, by attention to the general health, and to the uterine functions—aided, if need be, locally, by gentle leeching, followed by discussives. Of these latter none are so effectual, locally, as pressure; and this is very conveniently applied by means of the hydrostatic apparatus of Dr. Arnott.

Pendulous Breast.

The pendulous breast is an affection of advanced years; being but an exaggeration of the ordinary dug-like condition which this organ so generally assumes, in those who have borne children, and who habitually neglect support of the part in dress. The only warrantable treatment is palliation by suspension and support.

Partial Hypertrophy.

This is the "chronic mammary tumor" of Cooper. A portion of the gland becomes hypertrophied, with ultimate change of structure—yet simple; and enlargement of the lobules takes place, usually from the outward surface, constituting a soft unequal tumor. It is peculiar to the young adult, seldom if ever appearing after thirty years of age; and is almost always connected with disorder of the uterine system. Treatment is the same as for general hypertrophy. Marriage, followed by pregnancy and suckling, sometimes proves a successful means of cure.

The tumor, though originally most simple, is liable to degeneration. Consequently, when ordinary discussive means have failed, after due trial, it should be regarded as other tumors not amenable to discussion. "Common snakes are killed, because vipers are dangerous."

Various Tumors.

The gland may be the seat of *Simple sarcoma.* The treatment is first by discussion; and, if that fail, by excision. *Fibrous tumors* have a favorite site here. Though less liable to degeneration than any other morbid growth, they are certainly not exempt from that untoward occurrence; and, therefore, except in the aged, it is well to remove by operation that which can never grow better and may grow worse (*Principles*, 4th Am. Ed. p. 280). *Cystic sarcoma* is very common. Like the simple mammary tumor, it is most frequent under thirty years of age, and prevails chiefly among the better classes. The tumor is composed mainly of serous cysts, the parenchyma consisting of little more than the substance of the gland slightly altered. And there is some reason to believe that these cysts may sometimes originate in partial lacteal dilatation. By puncturing the cysts, and afterwards applying pressure, the tumor may diminish, consolidate, and gradually disappear, in the minor cases. But when the whole gland is involved, extirpation should be at once had recourse to; not only because other treatment will prove unsuccessful, but because such tumors are well known to be peculiarly prone to degenerate, more especially when irritated (*Principles*, 4th Am. Ed. p. 277). *True Hydatids* are also found in the gland. When single, they may be got rid of by puncture. When numerous, ablation of the part is expedient. *The Malignant tumors* of the mamma are unfortunately of proverbial frequency; more especially carcinoma. The general description of this tumor (*Principles*, 4th Am. Ed. p. 281) is not departed from; the chief peculiarity being in the nipple, which, early involved, is remarkably retracted and shrivelled in appearance. The glands of the axilla, too, are liable to be soon affected. The disease is known by the age of the patient, the hardness of the tumor, the character of the pain, the rate and mode of growth, the involvement of the skin and retraction of the nipple, the cachectic state of the system as evidenced by the countenance and general appearance. The only cure is by extirpation; but it is only a small number, of the many cases which present them-

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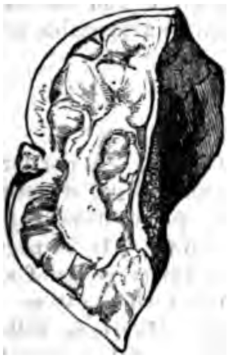
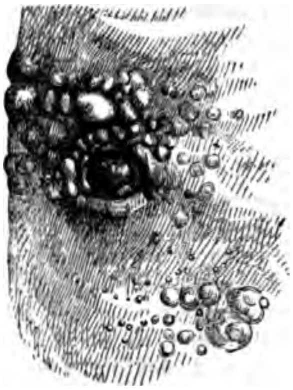
[1] I have known this simple morbid condition prove the precursor of inveterate carcinoma in the gland.

Fig. 186.



Carcinoma of the Breast, bisected. The figure of the tumor, with its effect on the gland and nipple shown.

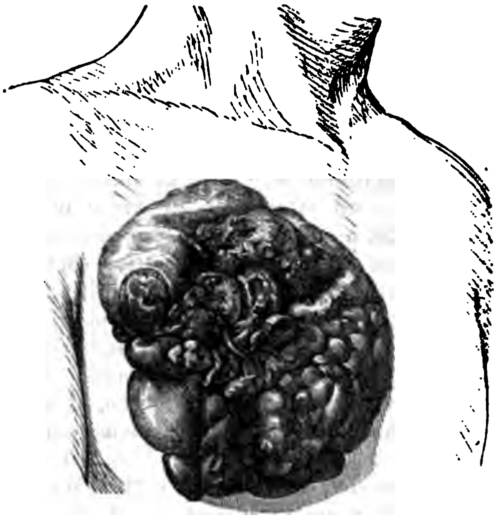
Fig. 187.



Carcinoma; secondary. An example of the numerous nodulated tumors, which often form in the cicatrix of the former growth. One is ulcerated in the site of the mammilla.

selves to the surgeon, which warrant operation; and it may be well to repeat here, that if the skin be much involved, if the nipple be much retracted, if there be a marked depression over the tumor, if the open condition be arrived at, if there be adhesion of the tumor to the pectoral muscle or to the ribs, if there be ominous signs of some obscure yet serious disorder proceeding within, and if there be glandular affection without—these, being all singly most unfavorable, and betokening relapse, do most certainly, when coming together, contraindicate all operative interference.

Fig. 188.



Fungus Hæmatodes of Mamma; fungoid, bleeding, and blood-like.

Extirpation of the Mamma.

The patient having been placed recumbent, and duly anæsthetized, the arm on the affected side is raised and held by an assistant, so as to stretch the pectoralis major, and facilitate incision. The knife is entered on the axillary aspect of the tumor, in a line with the mammilla, and is moved in a semi-elliptical direction towards the opposite point; a similar proceeding is adopted—above or below, as the case may be—to complete the ellipse; and the size of this space necessarily varies, according to the extent to which the integument seems to be involved, and according to the natural laxity of the parts. It is a fault to take away an undue amount of sound textures, so that difficulty is experienced in effecting and maintaining apposition of the wound; but it is a worse error to leave tainted parts, whereby reproduction of the disease cannot fail speedily to ensue. It is well to make the lower incision first; otherwise its course and position are apt to be uncertain, under the irrigation of blood. Then, on each aspect, the knife is sloped through the subcutaneous fat; and regular dissection is proceeded with from the axilla downwards, dividing the principal vessels and nerves at once, and so rendering the subsequent steps of the operation comparatively bloodless and free from pain (*Principles*, 4th Am. Ed. p. 298). The diseased mass—with its border of apparently sound tissue, in the case of malignant tumor—having been removed (*Principles*, 4th Am. Ed. pp. 287 and 298), is carefully examined on every aspect by both sight and touch; and, if need be, the knife is reapplied where thorough removal is not assuredly apparent. The vessels having been secured, the wound is brought together, and treated in the ordinary way.

Tumors external to the mamma—forming in its immediate vicinity, but not incorporated with it—are not uncommon. The simple are removed; leaving the gland undisturbed. In the case of the avowedly malignant, the entire gland, as well as the tumor, is taken away. Of this class of tumors—not in, but near the mamma—the majority are simple and fibrous.

Affections of the Mammilla.

The mammilla of the male is liable to hypertrophy and to malignant disease. In the one case discussives are expedient; the other demands free and early ablation.

The nipple of the female is also liable to hypertrophy, and malignant disease. In the former case no direct interference is required; in the other, there is safety in nothing short of summary removal—not only of the nipple itself, but of the mamma also. There is one case, however, in which it is unnecessary to sacrifice more than the former;—when the nipple has been hypertrophied many years, and begins to degenerate in structure. Such degeneration usually commences in, and is at first limited to, the apex; and, in such a case, to cut at the root of the nipple is to cut in sound parts.

The fissured and excoriated nipple of the nurse is an affection as frequent as distressing. A bare enumeration of alleged cures would occupy much space. Suffice it here to say that the same treatment is necessary as in inflamed and irritable sores, modified by regard to the uses of the part. During application of the child, the nipple is protected by a shield; and in the interval some of the many remedies are applied, which are not likely to injure the child, while at the same time they tend to soothe and heal the affected part.

Abernethy on Tumors, Lond. 1804. Cumin, a General View of Diseases of the Mamma, &c., Edin. Med. and Surg. Journal, vol. xxvii, art. 1, 1827. Cooper, Illustrations of Diseases of the Breast, Lond. 1829. Jeanselme, Memoire sur les inflammations et les absces du sein chez la femme, Gazette Medicale, Jan. 1839. C. Bell on Carcinoma Mammæ, Med. Chir. Trans. vol. xii, p. 713. Brodie, Lectures on Pathology and Surgery, Lond. 1840. Birkett on Diseases of the Breast, Lond. 1850. Forget, Bulletin de Therapeutique, tom. xxvii, p. 355. [Lebert, Traité Prat. des Malad. Cancéreuses, Paris, 1851. A. Bérard, Diagnost. Different. des Tum. du Sein, Paris, 1842. Velpeau, Traité des Malad. du Sein, Paris, 1854, and London (translat.), 1856. Walshe, Treatise on Cancer, Lond. 1853. Donaldson, Application of Microscope to Diagnosis of Cancer. Am. Jour. Med. Sci., for Jan. 1853. Druitt, on Cancer, Assoc. Jour. for Jan. 1854; also Surgeon's Vade Mecum, 7th Ed. Lond. 1856. J. Z. Laurence, Pathology of Cancer, London, 1856. See also *Principles*, 4th Am. Ed. p. 304.]

CHAPTER XXVII.

AFFECTIONS OF THE ABDOMEN.

Abscess of the Abdominal Parietes.

Abscess of the abdominal parietes sometimes occurs spontaneously; frequently, it is the result of external injury; and, in some systems, but a slight blow—or a strain, as in retching—may suffice. The site of the abscess is more frequently deep-seated than superficial. At first there is a hard, tender, increasing tumor, which softens obscurely as it enlarges, and slowly points. Treatment varies according to the stage. At first, while the inflammatory process is but recent and slight, and the swelling consists of plastic exudation, resolution is in our power, by rest and antiphlogistics. Advancement of the tumor is arrested, and the hard swelling begins to disappear. This subsidence may be accelerated by judiciously used discussives—employed, however, always with the greatest caution, inasmuch as we know by experience that if they be used either too freely or too soon, there is here a great probability of inflammatory reaccession, in an aggravated form. So soon as the formation of matter has been at all indicated, a free evacuating incision should not for an instant be delayed; it being remembered that the pus is much nearer to the peritoneum than to the integument, and moreover bound down by strata of dense fibrous tissue. But it is surely advisable to go a step further; and whenever we feel convinced that reasonable hope of arrest and resolution is gone, make an incision in the most prominent part of the swelling, where we anticipate that matter is first and mainly to form, in order that so soon as it does form it may find a ready drain for its outward escape; all the hazards of its pent up accumulation, in any quantity, being thereby felicitously avoided. If artificial opening be withheld, one of two events is very likely to occur; the pus, finding its way into the general cavity of the abdomen, excites a most hazardous peritonitis; or, on spontaneous evacuation taking place, the condition of fæcal fistula is declared—the perforation internally, surrounded by plastic exudation, having penetrated into an adherent fold of intestine.

As already stated, cherry stones, and such like substances, may be arrested in the vermiform process of the cœcum, and cause abscess of the abdominal parietes; so effecting their own escape.

Tumors of the Abdominal Parietes.

These demand also early attention, lest, by long continuance and enlargement, they become unfavorably connected with the deepest portion of the parietal layers. The adipose is, perhaps, more common than any other form of tumor in this situation. In dissecting it out, the preliminary incisions should penetrate quite into the substance of the fatty matter; thereby facilitating extraction, and avoiding unnecessary depth and extent of incision.

Bruise of the Abdomen.

This is always important; on account of risk of injury to the abdominal contents. Dangerous hemorrhage may at once occur by lesion of these, or formidable inflammatory disease may be kindled subsequently. And, in treatment, both of these contingencies must be regarded. Absolute rest and quietude are enjoined; and the simplest ingesta are given most sparingly. Thus, extravasation of blood from a torn part is not favored; neither is escape of contents from any ruptured viscus promoted—on the contrary. On the first rising of the pulse beyond the limits of moderate reaction, on the accession of increased pain, with vomiting or other sign of disorder of the system—in other words, so soon as there is any indication of the inflammatory process having begun—the lancet is employed freely, and is followed by calomel and opium, as circumstances may demand. And here the opium may be administered in a larger proportion than usual (*Principles*, 4th Am. Ed. p. 150); it being the only available opponent of the intense and exhausting pain which attends on such disease; and it besides being of good service, in injury of the intestines more especially, by exerting a sedative effect on the muscular coat of the bowels. Very obviously, purging is not to be dreamt of, in the early treatment. Subsequently, when it is necessary to move the bowels, the gentlest remedies are to be selected; and even they are used with caution.

The first effect of bruise, attended with serious injury of the internal organs, is to produce a marked state of shock, or depression, in the system. And a very common error in practice is, at once to attempt removal of this. The same evil consequences follow, as in the analogous case of injury done to the cranial contents. Let the patient alone; and ere reaction occurs, with its quickened and full circulation, a torn liver or spleen may have had its vessels closed by Nature's hemostatics, and a ruptured portion of intestine may be so circumstanced by position and exudation, as to render fatal escape of its contents into the peritoneal cavity at least less probable. But, stimulate unwisely; and then premature reaction is established; the returning blood finds the mouths of vessels still open, and intestinal extravasation is quite unopposed. In one case, only, are we to interfere; and that is, when the shock is extreme in both intensity and duration, and threatens to prove directly fatal. Then we stimulate to save life from immediate loss; and yet we stimulate very cautiously, lest, saving from one hazard, we engender another at least as great.

A remote consequence of abdominal bruise may be such atrophy of the muscles at the injured part as shall cause permanent weakness there, with consequent liability to hernial protrusion.[1]

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[1] Guthrie, Lancet, No. 1441, p. 397.

Wounds of the Abdomen.

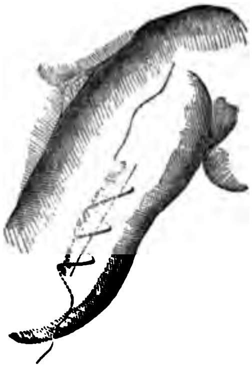
Wounds penetrating the abdominal parietes, and implicating the viscera within, are necessarily fraught with much danger. From lesion of the liver, a formidable hemorrhage can hardly fail to occur; wound of the urinary bladder causes infiltration of the contents, almost invariably fatal; from wound of the gall-bladder, acrid bile will escape, kindling intense peritonitis; both acrid extravasation and dangerous loss of blood are likely to follow wound of the kidneys; wounds of the spleen, like those of the liver, are dangerous mainly on account of the risk of hemorrhage; from injured intestines, fæcal extravasation is likely to take place, causing an extent and amount of inflammation which is seldom if ever recovered from. Such severe injuries are invariably attended with a grave amount of shock, which serves the double purpose of warning the attendant of the importance of the case, and giving an opportunity for the completion of Nature's measures for obviating hemorrhage and extravasation. This state, as formerly observed, is not to be rashly interfered with by the practitioner; its progress is watched; reaction is rather delayed than hastened; and when this, no longer repressible, advances to excess, antiphlogistics are employed actively.

Wound of the Bowel—suspected when discharge of blood by the mouth or by the anus accompanies the attendant shock—is not necessarily followed by extravasation. A mere puncture is closed by Nature's efforts. The mucous coat is protruded outwards, and plugs the orifice; the abdominal viscera exert a constant equable pressure on each other at every point, and this tends obviously to counteract escape of contents; and these two temporary means of arrest are duly followed by another which is permanent—namely, exudation of plastic lymph on the exterior of the wound, whereby union of the opposed surfaces of peritoneum, and a safe circumvallation of the injured part, are effected. As in natural hemostatics (*Principles*, 4th Am. Ed. p. 306), the temporary means are by plug and pressure, the permanent by plastic exudation. A moment's consideration of the nature of this process will explain how mischievous must be the imprudent exhibition of stimuli, or indeed of ingesta of any kind, at the outset of the case.

Protrusion of the Bowel.—If through a penetrating parietal wound a portion of intestine, or other viscus, protrudes entire, it is to be simply replaced; with all gentleness, so as not to endanger an aggravation of inflammatory accession; and yet with all accuracy—the finger following the retreating viscus closely, so as to insure its being replaced wholly within the abdominal cavity, and thus avoiding the serious risk of obscure strangulation, which is so prone to follow partial reduction. The wound is carefully approximated—by suture, if need be; and by moderate bandaging such pressure is made without, as is calculated to prevent reprotrusion. In subsequent treatment an anxious prophylaxis is maintained, with a preparation for suitable antiphlogistics on the shortest notice.

If the protruded part be found to have sustained mere puncture, it may be simply replaced, as if intact; trusting to Nature's means of closure. If a larger wound exist—incised, of no great extent, and consequently deemed capable of adhesion—it is to be brought accurately together by the glovers' suture (*Principles*, 4th Am. Ed. p. 564). And, in applying this, it is well to turn in the edges of the wounded part gently, so that the approximated surfaces shall be peritoneal; that structure being well known to be much more capable of the required plastic exudation, than are the mucous or middle coats of the bowel. The punctures of the needle should not be more than a line apart; and the fingers of an assistant should accurately retain the inverted condition of the wound during the manipulation. It is well to take the first stitch from within outwards; and the placing of a large knot here is supposed to favor the inward escape of the thread; which in time ulcerates its way into the cavity of the bowel, and is thence discharged. The suture having been duly arranged, the part is gently replaced; in the hope that it may become safely covered up by plastic exudation.

Fig. 189.



The glovers', or continued suture; in wound of the bowel.

If the portion of bowel be bruised, or otherwise so extensively injured as to render the occurrence of adhesion obviously impossible, it were folly to effect mechanical union and replacement of the part. After such procedure, the wound must necessarily inflame and open, feculent extravasation is inevitable, and death is almost certain. The wounded part should be retained at the surface; and, with this view, the peritoneal coat is united with the integument, at the lip of the wound, at one or more points by suture; and then through the upper orifice of the wounded part the feculent contents discharge themselves innocuously. The condition of *Artificial Anus* is established; a state of much discomfort, and not altogether devoid of danger; but infinitely preferable to fatal peritonitis by feculent escape within the cavity of the abdomen.

Thus, the local treatment differs according to the nature of each case. But in all, the constitutional treatment is the same: rest and quietude; starvation; free venesection or leeching, or both, on the first onset of the inflammatory process; then calomel and opium—the latter in large doses.

Artificial Anus.

By this term is meant an unnatural outward opening of the intestinal canal, whence fecal contents are more or less copiously discharged. It may be the result of wound, of abscess and ulceration, or of sloughing consequent on strangulated hernia. By plastic exudation the open portion of bowel is retained in contact with the abdominal parietes; and the following condition of parts becomes established. The orifice of the upper or gastric portion remains abundantly patent, and not unfrequently troublesome prolapsus of its lining membrane occurs; the orifice of the lower or rectal portion contracts, is not patulous, and recedes from the external surface; the two portions have a dense septum interposed between them—composed mainly of the two contiguous portions of the coats of the bowel; and this becomes more and more solid, and more and more opposed to restoration of the normal flow of the intestinal contents. Outwardly the abdominal parietes are usually distended into a funnel-shaped cavity, whose apex is at the integument, whose base surrounds the intestinal breach, and within whose cavity feculent matter tends to accumulate. The integumental opening is red, everted, prominent, and surrounded by excoriation.

The dangers and difficulties of such cases depend very much on the site and extent of the intestinal opening. If this be large and near the upper part of the tube, death by inanition can scarcely fail to occur; chyle running so much to waste. If, on the contrary, the opening be in the large bowel, nutrition may be sufficiently maintained, and the result will probably be one more of annoyance than of danger.

Treatment is in the first instance palliative. Such food is taken as is easily digested; and the bowels, by diet, and medicine, if need be, are kept "soft and easy." By external support—by compress and bandage, or by the adaptation of a suitable truss—outward escape from the upper orifice is moderated, if not altogether prevented, and protrusion of the mucous membrane is opposed. And the ordinary means are employed, to obviate excoriation of the surrounding integument. The outer opening may contract and heal, the funnel-shaped cavity may close, and the normal flow may be restored. But much more frequently such is not the case; and further interference by our art is required. The two main obstacles to cure plainly are—projection of the septum, and retraction of the lower intestinal orifice. The latter state is to be opposed by the occasional introduction of tubes or tents, gradually enlarged, whereby the normal calibre may be restored. The septum is to be got rid of, by the gradual process of ulceration. Dupuytren's forceps may be employed for this purpose;—one blade passed into each orifice, the instrument closed and locked, and the degree of pressure regulated by the screw at the handle. The pressure is at first applied lightly and temporarily; lest excess of the inflammatory process ensue, and the surrounding parts be implicated so as to establish either enteritis or peritonitis. And throughout the whole period of the instrument's use, the effects must be closely watched, lest at any time such accidents threaten to occur. By thus gradually destroying the septum—inducing ulceration of it by pressure, and regulating that pressure so that the inflammatory process it creates shall not go beyond ulceration in the part, nor extend thence to the neighboring textures—by dilating and bringing forward the lower orifice, and by maintaining the external pressure at all times when the forceps and tent are not in use, we hope to restore the normal flow, and effect permanent closure of the aperture. But not only must this use of the forceps be cautiously conducted; it must also be warily begun. Weeks or even months should elapse before it is employed. For, an early application is plainly in favor of the occurrence of the following risks; a fold of bowel interposed between the two orifices on account of the septum not being yet fully developed, may be grasped by the instrument, and fatal enteritis may ensue; or the yet recent, tender, and imperfect adhesions of the bowel to the parietes may be broken up, the former may recede, feculent extravasation then takes place, and life is soon ended miserably by peritonitis; or, simply on account of the still unquiet parts having no tolerance of a newly excited inflammatory process, immature use of the forceps may be speedily followed by enteritis; or the pressure may cause ulceration of an asthenic kind—not attended by plastic exudation around—the abdominal cavity may consequently become exposed, and feculent extravasation may occur therein.

The projecting septum, or *eperon*, may be repressed simply by the pressure of tents; or the ingenious, though somewhat complicated instrument of Mr. Trant[1] may be used instead of that of Dupuytren. Such pressure, causing replacement and absorption of the projecting obstacle, is obviously more safe than that which produces destructive ulceration.

An artificial anus is sometimes established, designedly, by the surgeon; when the natural anus is imperforate; or when, from any cause, the rectum has become insuperably obstructed. These proceedings will be considered, in connection with affections of the lower bowel.

Fecal Fistula.

When an artificial anus has contracted to a narrow sinus, with a papillary orifice through which intestinal contents occasionally escape, it is termed a Fecal Fistula.

A similar state may also result from parietal abscess; whose cavity has opened, by ulceration, into a portion of adherent bowel, either before or after external evacuation. The opening of communication is usually small; the cavity of the abscess contracts; and the condition of fistula is soon established.

The methods of treatment are simple. Accurate and firm pressure is applied to the part, so as to prevent feculent escape, and favor consolidation of the entire track. This may succeed, after patient continuance for some time, along with due attention to the state of the bowels. If it fail, then the actual cautery may be applied, so as by contraction of the burn (*Principles*, 4th Am. Ed. p. 199) to obtain closure. And if this do not succeed, then by autoplasty the chasm may be filled up and permanently consolidated; a suitable portion of integument being transplanted from a neighboring part.

Pelvic Abscess.

The sub-peritoneal areolar tissue, in the pelvic region, is liable to be the seat of suppurative inflammatory disease; sometimes in connection with the puerperal state, but often wholly independent of this. Occasionally it is induced, on the right side, by irritation extended from the caput cœcum—forming the *perityphlitis* of Burns and others; on the left side it may originate in impaction or other disorder of the lower bowel. It has followed operative interference with the uterus or its appendages—as well as with the penis and bladder—not unfrequently;

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[1] Dublin Med. Press, vol. xiii, p. 305; and Brit. and For. Med. Chir. Rev. Jan. 1847, p. 28.

sometimes it is traced by the patient to a chill; sometimes it can be connected with no assignable cause. The disease is more frequent in the female than in the male. Exudation may be both rapid and copious; and at first is either serous or lymphous. In this state it is amenable to absorption; and under suitable treatment may disappear rapidly. When suppuration has fairly taken place, evacuation is to be looked for, either spontaneously or by the hand of the surgeon. In the former case the point of exit varies; at the hypogastrium, by pointing in the ordinary way; in the groin, by the bowel, through the vagina, into the bladder; or into the general abdominal cavity. Fortunately, the last mentioned casualty is comparatively rare; the peritoneum, from its fibrous nature, long resisting the ulcerative tendency of the accumulating pus. Sometimes, instead of suppurating, the tissue becomes loaded with a dense plasma, partially incorporated and organized.

The symptoms are often ushered in by rigor. There are pain and tenderness of the part, with dulness on percussion. The rectum and bladder, being compressed, and involved in sympathy, have their functions more or less disturbed; and the uterus, too, is liable to displacement. On examining by the vagina or rectum, a hard dense swelling is perceived; determined to be non-uterine, if need be, by the use of the probe; and, unlike other pelvic tumors, having very firm connection and continuity with the bony walls of the pelvis. In doubt, an exploratory thrust may be made by the small trocar—through the abdominal parietes, by the vagina, or by the rectum, according as the site of the swelling may determine. On outward pointing taking place, the nature of the case becomes abundantly plain.

At an earlier period, the treatment consists of leeching, followed by counter-irritation, and mercury pushed to ptyalism. Iodine may be painted over the abdominal parietes; or it may be administered in the form of ointment, by the vagina. Under such treatment, with rest, and attention to the general health, many formidable effusions satisfactorily disappear; perhaps leading an inexperienced observer to suppose that an ovarian or other tumor has been discussed. When matter has formed, it should be early evacuated, by means of the bistoury or trocar, at the point which circumstances may indicate as most suitable; by the vagina, by the rectum, or through the abdominal walls.

Retro-uterine Sanguineous Tumors.

There is another class of swellings in this situation, which may be mistaken for the inflammatory pelvic tumor, in the female. They are caused by extravasation of blood into the sub-peritoneal areolar tissue of the *cul de sac* between the uterus and rectum; and in their pathology resemble the thrombus, which is not unfrequently found situated in the vagina or vulva. The affection may, in fact, be described as a thrombus of the roof of the vagina. Attention has been recently directed to this subject by some late discussions in the Surgical Society of Paris; and Dr. Montgomery, of Dublin, has published cases of thrombus in this situation, occurring during or after labor.

The blood is infiltrated into the areolar tissue, around the cervix uteri, and may spread thence into the areolar tissue surrounding the rectum, or into that involved between the folds of the broad ligaments. These tumors are liable to occur chiefly in cases where there is much venous congestion, and especially if there is a varicose and diseased condition of the vessel. They are caused by powerful straining efforts, as in labor, venereal excesses, &c. They may also, as M. Huguier points out, be produced by the escape of blood from a uterus over distended by retained menstrual secretion.

On examination, the roof of the vagina will present a hard resisting surface, without pain on pressure; or, if recent, tender to the touch in a much less degree than the real inflammatory pelvic tumor. The uterus will be found generally somewhat elevated, and pressed to the pubes.

If they are small, these tumors require no special treatment. Rest in the recumbent position, and the antiphlogistic regimen, are necessary as precautionary measures. If the extravasation is very extensive, there will be constitutional disturbance; and local excitement may be produced, perhaps terminating in true inflammation. In this case treatment must be conducted as in the common inflammatory pelvic tumor.

Ovarian Dropsy and Tumors.

Of abdominal tumors, the ovarian are those which most attract the attention of the surgeon. Occasionally fibrous tumors, or masses of the different forms of the ordinary malignant tumor, are found affecting the ovary, either alone or in combination with the cystic disease of the organ —which latter very far surpasses all others in the frequency of its occurrence, and is generally known as *ovarian dropsy*. These cystic tumors are multilocular more frequently than monolocular. They may occur only on one side, or on both at the same time; they may be attached by a narrow pedicle to the broad ligament, or by a broad base; they may be movable, or fixed in the cavity of the abdomen—this generally depending on their size, which varies extremely; they may be free, or more or less adherent to the surrounding organs, or connected with the abdominal walls. On dissection the ovary of the affected side may be undiscoverable; or it may be either entire, or partly incorporated with the tumor. The disease is believed by numerous pathologists always to originate in the Graafian vesicles; and there is good reason to attribute certain of these productions to this source; but it is equally well ascertained that the multilocular formation does not always acknowledge such an origin.

The disease may affect a woman at any time of her menstrual life, and is found occurring most frequently at that period when the reproductive functions are in greatest activity—namely, between the ages of twenty and forty. It attacks the virgin as well as the married woman. Of course it is found more frequently in married than in unmarried women, but there is no evidence for a common statement of authors that the former are more liable to it than the latter.

Many causes connected with menstruation, marriage, and parturition, have been assigned to ovarian dropsy, but this part of the history of the [illegible] These affections [illegible]

[illegible] giving rise to [illegible] derangements effected [illegible] of the menstrual [illegible] commencement [illegible] either side, or a [illegible] modifications [illegible] The tumor [illegible] and a feeling of [illegible] of it by [illegible] and difficulty in defe- [illegible] of the legs are often [illegible] almost entirely in the [illegible] distension of the [illegible] an early stage; and the [illegible] circumstances of its [illegible] a later period when it is [illegible] physical characters, [illegible] and progress.

[illegible] swelling [illegible] be so uniform [illegible] as well as [illegible] the following points: [illegible] parts, while the [illegible] generally to [illegible] stomach occupy [illegible] sound over the [illegible] umbilical and [illegible] sound exists [illegible] cyst which is deve- [illegible] and poste- [illegible] detected in [illegible] the anterior cysts of [illegible] may be scarcely perceptible; [illegible] fluctuation may [illegible] variety, the larger [illegible] distinctness of the [illegible] same cyst; and by its indis- [illegible] cyst, and the other on a [illegible] In encysted dropsy, the general health is often compara- [illegible] almost always found to be the case. Along with ascites, there is generally anasarca of the lower extremities, while in ovarian dropsy this is rarely observed. In the latter affection, however, we frequently find a varicose state of the vessels, and [illegible] of the limbs. It is also to be remembered that ascites and ovarian disease frequently coexist: the ascitic fluid being of the ordinary kind: or, as has been observed by Dr. Bennett and others, derived from an ovarian cyst by passing through foramina in its walls. When these diseases coexist, fluctuation, if light and superficial, may deceive; but if the fingers are pressed more deeply, a peculiar diagnostic mark is obtained by the stroke of the fingers against the ovarian cyst—after displacing the overlying ascitic effusion. If there is still doubt, we may in some cases be justified in drawing off a few drops of the fluid by a small trocar, and ascertaining its nature by proper tests.

Dulness on percussion over the hypogastric regions is more decided in ovarian dropsy than in ascites. If, however, the pedicle be long, and the tumor only moderately large and not distending the abdominal walls, but rather floating in the cavity, there may be some resonance above the pubes. In some rare cases this mark is of importance, in distinguishing the ovarian dropsy from pregnancy;—in both cases we may find on auscultation a murmur resembling the placental *soufflé;* and in ovarian disease, especially if recent, the equivocal signs of pregnancy may be present. From pregnancy it is further distinguished by absence of the fœtal heart's pulsation, by the absence of ballottement,[1] by the drawing up of the uterus and vagina so that the cervix is with difficulty reached, by the hardness and length of the cervix, by the anteverted or retroverted state of the organ, by the commencement of the disease on one side, by more or less complete absence of the ordinary constitutional signs of the pregnant state, and by the duration and history of the complaint. Let the surgeon, however, never forget that with ovarian disease (at least of one side) there may coexist an impregnated womb.

There is occasionally great difficulty in distinguishing a multilocular ovarian dropsy from fibrous or other tumor of the uterus. The tension of the cysts, their small size, and the viscidity of their contents, may be such as to destroy all signs of fluidity in the ovarian mass, and the uterus may be so fixed in the pelvis by compression between it and the tumor, or by adhesions, as to render the signs derivable from a vaginal examination also nugatory. The history of ovariotomy too truly shows that the diseases may be mistaken for one another by the most experienced and able physicians. The chief distinctive marks are the following: A fibrous tumor is often observed first in the centre of the hypogastrium—an ovarian tumor generally at one side; a fibrous tumor grows more slowly than an ovarian; it has no fluctuation, and is generally much less movable and harder than a diseased ovary; it is more frequently accompanied by menorrhagia and leucorrhœa; the uterus is generally somewhat prolapsed, especially if the tumor is not of great size; the uterus feels heavy, and cannot be moved without moving the tumor; the cavity of the uterus is also often elongated; sometimes it is shortened; frequently the shape and plurality of the tumors are distinctive.

In illustration and proof of the great difficulties which attend the diagnosis of ovarian disease, and of the errors liable to be made, even when the growth is so developed as to appear to demand an operation, we may cite the following fact in regard to 162 cases in which incision of the ovary was attempted. In 60 of these there was either no ovarian disease at all, or its removal was found impracticable.[2]

The management of ovarian dropsy is either palliative or radical.

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[1] A modified ballottement may be discovered in the case of ovarian tumor, if it is of moderate size, and floating in ascitic fluid.

[2] Lancet, Dec. 6, 1851.

[illegible] of inflammation, [illegible] and [illegible] pre[illegible] affec[illegible] which [illegible] complain till [illegible]

[illegible] till the [illegible] large size [illegible] pain and [illegible] by pres[illegible] and the [illegible] been exag[illegible] Atlee, and [illegible] in which [illegible] patient's [illegible] by some [illegible] are syncope, [illegible] of the cyst or [illegible]

[illegible] The patient having been seated on the side of [illegible] sheet or flan[illegible] by two assistants, directed to [illegible] so as to maintain equable [illegible] the sudden loss of sup[illegible] which serious he[illegible] abdominal veins [illegible] support. [illegible] of rup[illegible] sudden accumu[illegible] It is well to ascertain that the bladder is empty. An opening having been made in the bandage, an [illegible] is made through the skin and fascia by a lancet or scalpel; and then [illegible] completed by a large trocar and canula. The trocar having been withdrawn, the canula remains, and through this the fluid escapes [illegible] and [illegible] or viscid, ropy, and variously discoloured. Fluid having ceased to come, the canula is withdrawn, the wound is covered by a compress, and the general bandage of the abdomen is drawn tightly and secured. This cure by tapping is an excellent instance of the surgeon taking a lesson from the plans sometimes adopted spontaneously by Nature. Examples of the simple cyst, and more rarely of the multilocular, have been cured by spontaneous discharge of the contained fluid from openings through the umbilicus, or some other part of the abdominal wall, or by discharge of the fluid per vaginam or per rectum.

The point usually selected for the opening is in the linea alba, about midway between the umbilicus and symphysis pubis. But it may be made in the linea semilunaris, if the bulging of the ovarian cyst render that locality preferable.

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[1] By keeping the patient horizontal on the side, during the whole period of the operation, the necessity for bandaging and pressure may sometimes be in a great measure superseded.

By the use of pressure after tapping, the walls of the cyst are made to collapse, and the mass comes to form a comparatively small firm tumor in one side of the pelvis. When such pressure is resorted to, it should be kept up for some months; as these tumors have been known to refill, after they have lain in the pelvic cavity for a long time collapsed and causing no inconvenience. The use of pressure, if it can be borne, and be regularly conducted, is decidedly of service in impeding growth of the tumor, and refilling of the sac after tapping. Some very interesting cases are recorded, where inflammatory disease, attacking the cyst and its serous investment, has induced such induration, and caused the formation of adhesions so strong, as to resist further progress of the tumor; curing the disease by mechanically arresting its progress. But the cysto-sarcomatous tumors, the fibrous, and the malignant masses, which are not unfrequently found in this situation, either alone or along with the multilocular cyst, are, of course, not amenable to any method of discussion.

As auxiliaries to tapping and pressure, the only remedies to be recommended are iodine and diuretics. The former may be used both externally and internally. That they may be of some service, we have evidence in the fact occasionally observed, that the rapidity of the growth or refilling of an ovarian tumor keeps pace with the diminution of the urinary secretion. The remarkable increase of this secretion often observed for some days after tapping, is sometimes accompanied by progressive diminution of the tumor, which recommences to fill only when the urine again diminishes.[1] In general, after tapping, the cyst speedily refills, and the operation is repeated as before, the cyst usually filling more rapidly after every repetition of the operation. The second tapping may not be required till after several months; but subsequently the interval may diminish to a few weeks. This process generally exhausts the patient after some years, or an intercurrent attack of inflammation of the cyst, or in the peritoneum, may prove speedily fatal. Sometimes, however, patients survive to have the tapping very often repeated, and almost incredible quantities of fluid have thus been drawn off from the same woman.[2]

These tumors may be dealt with heroically. Attempts may be made at extirpation. The operation is very simple. The patient having been suitably arranged in a room of elevated temperature, a wound is made through the parietes of such an extent as may be necessary. There is no good reason for incising the whole abdomen in all cases, from the ensiform cartilage to the symphysis pubis. The external incision should be proportioned to the bulk of the tumor.

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[1] Many authors of note entirely discredit the efficacy of all internal remedies. Burns says they have an equal effect "over the configuration of the patient's nose." Hamilton, as is well known, used the solution of muriate of lime internally as a discutient, and placed great confidence in it.

[2] Dr. Mead's patient, whose endurance is celebrated in the following epitaph, has now unfortunately been frequently surpassed.

"Here lies Dame Mary Page,
Relict of Sir Gregory Page, Bart.,
Who departed this life March 21st, 1728,
In the 56th year of her age.

In 67 months she was tapped 66 times,
Had taken away 240 gallons of water,
Without ever repining at her case,
Or even fearing the operation.

Dr. Martineau, of Norwich, tapped a patient 80 different times, and drew off 6832 pints of fluid.

The dissection is to be carefully conducted till the tumor be brought into view, attention being directed to arrest as far as possible all bleeding from the wound. The tumor, its state as to adhesions, and its pedicle, are now to be examined; and, if deemed advisable, the operation is continued. Unless the adhesions are very strong and extensive, they do not form an insuperable obstacle. The tumor is to be turned out of the abdomen; the pedicle is tied, and then divided; and the tying may be so managed as not to include any of the peritoneum—this having been previously dissected off. The wound and the surrounding viscera are sponged clean, and the wound closed. If unfortunately the bowels cannot be kept within the abdomen during the operation, means must be taken to maintain in them their natural heat till they are replaced; they may be immersed in water at blood heat, or in fine linen moistened with tepid water. The ligature of the pedicle is brought out at the lowest part of the incision; and last of all, the wound is closed by the interrupted suture, in such a manner as to expose as little as possible to the surface of the bowels beneath. This is effected by passing the needle close to the peritoneal surface of the wound. The interrupted quilled suture may sometimes be of service.

In conducting the first step of the operation, the plan proposed by Dr. Frederick Bird, to avoid mischances, may be resorted to—namely, to make at first only a small wound into the peritoneum, and to explore the tumor with the finger and probe; so ascertaining, to some extent at least, the feasibility of completing the operation before the patient is compromised by further proceedings. At present great hostility to all such operations is declared by a large body of the profession. There are cases, however, which may certainly render a duly conducted attempt quite warrantable; when the tumor is non-malignant, single, movable, and connected with a narrow pedicle; when the patient is apparently free from other disease; when the effects of this tumor are such as to threaten death by exhaustion at no distant period, unless relief be obtained; when the ordinary palliative treatment, after due persistence, has failed to give relief; and when the patient, having been made fully aware of the risk, is resolved and wishful to undergo the operation. Modern experience has certainly demonstrated, that free incision of the abdomen, with exposure and manipulation of the peritoneum, is a less hazardous procedure than was generally supposed. But there are extreme dangers necessarily attendant upon this operation—from its site and its nature, from the necessity of leaving in the wound a long cord attached to the pedicle, from the danger of the ligatures bursting, or the wound in the parietes partially opening, in consequence of distension of the bowels or efforts in coughing, and from the risk of strangulation of the bowel either in the wound or by the puckering of deep cicatrices. And, besides, the following unavoidable difficulties at present stand in the way of a general recommendation of the operation; namely, the confessed difficulty of diagnosis—as to the existence of extensive adhesions, as to the presence of malignant disease in the tumor or in the pedicle, and as to the large size of the pedicle rendering deligation difficult.

Sometimes cure is attempted by a minor proceeding; making an opening in the abdominal parietes, only a few inches in length; puncturing the cyst, and drawing it out as the contents escape; and then cutting off the attachment, after deligation. Such an operation, however, has not been found more successful than the more direct and open procedure; and certainly it is not more easy of performance. The danger of some fluid from the cyst escaping, and finding its way into the peritoneal cavity—the impossibility of cleaning out the wound with the necessary care—the imperfect deligation of the pedicle, &c., are obvious objections to this mode of treatment.

The statistics of ovarian operation give a mortality of about one death in every three cases. Its dangers, then, are very great. On the other hand, hopes of relief from ordinary treatment of the tumor cannot be sanguine. Most women are carried off by the disease in less than four years. Very few have the good fortune to be cured, and only a small number live beyond the four years. But it will always be a difficult and anxious matter for the surgeon to propose that a woman suffering, it may be, very little from this disease, should subject herself to the risk of almost immediate death, in order to obtain the chance of getting rid of that which might possibly permit several years of comfortable existence.

The general treatment of ovarian disease is still an open question; and we entertain strong and confident hope that the great attention drawn towards it will, some day, attain to the discovery of a method of cure, or of a plan of palliation tantamount to cure. But we do not purpose to mention here any of the numerous methods now proposed for these objects. As yet, they have mostly proved even more fatal than ovariotomy, and have many additional objections. None have received the sanction of the profession.

Fibrous Tumors of the Uterus

May be found in any part of the organ. They may be single, but more frequently there are several present together. They may vary in size from a pea to a man's head. They rarely occur before the age of twenty, and are most frequently observed about the age of forty.[1] They do not prevent conception, but cause great risk of abortion during pregnancy, and in delivery may obstruct the advance of the child, also favoring hemorrhage and subsequent inflammation. The tumors themselves are liable to congestion, inflammation, and suppuration; in course of time, they may become calcified in whole or in part; forming the uterine calculi of old authors. They may be developed in any part of the uterine wall; the nearer to the mucous membrane, the greater is the hypertrophy of the uterine tissue. When the tumor is situated near to the peritoneal or to the mucous surface of the uterus, it may be protruded from the wall of the organ in a polypoid form; and, the pedicle gradually diminishing in size, the tumor may drop off into the peritoneal cavity in the one case, and in the other may be expelled per vaginam. When the tumor is near to the mucous surface it is sometimes spontaneously discharged in another way, as has been observed to occur even in large tumors; and not unfrequently this result has followed the irritation and pressure caused by the efforts of delivery, on the tissues interposed between the cavity of the uterus and the tumor. By ulceration or sloughing, an opening is formed in these textures, and the substance of the tumor is exposed; disorganization ensues in the loose areolar tissue connecting the tumor to the uterus; contractions of the hypertrophied uterine tissue supervene; and expulsion of the tumor, in mass, or more gradually in parts, is the fortunate result. This may be called spontaneous enucleation; a process which has been imitated by art in some cases. If the tumor becomes polypoid, dilating the cervix or lying in the vagina, it may be treated as an ordinary uterine polypus. But it is to be remarked that more danger of uterine phlebitis attends the removal of this form of tumor, than of the ordinary uterine polypus.

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[1] Bayle states that in women above thirty-five years of age, fibrous tumors are found in one out of every five.

The symptoms attending the presence of these tumors are neither constant nor diagnostic. Physical examination alone can detect their presence and decide upon their nature. They are generally accompanied by feelings of weight, pain, or uneasiness in the hypogastrium, and pain in the back, in the side, or in the thighs—disorder of the functions of urination and defecation, &c.; but sometimes no symptoms at all exist. Often there is an increased amount of vaginal secretion and discharge, which may be checked by a mild astringent injection. Menorrhagia not unfrequently occurs, and may require the ordinary treatment, if severe; it is generally a sign of proximity of the tumor to the mucous membrane. Occasionally, but rarely, there is amenorrhœa. If the tumors become congested and inflamed, ordinary antiphlogistic treatment is necessary—especial attention being paid to maintenance of the recumbent position. If the tumors are large, prominent, heavy, or movable, an abdominal bandage or binder may be useful to support and fix them, and to afford the patient a feeling of security.

Nothing can be done in the way of discussing these growths. Discutient remedies, as iodine, used externally and internally, counter-irritants, rest, the occasional local abstraction of small quantities of blood by leeching or cupping, have often a beneficial effect in removing disagreeable symptoms, and sometimes seem to arrest growth, or even cause a diminution in size—probably by removing the surrounding swelling and engorgement.

Gastrostomy.[1]

In the case of insuperable obstruction of the pharynx, œsophagus, or cardia, it has been proposed to open the stomach by direct incision; attaching the edges of the opening in the stomach to the integumental wound; and thus constituting a permanent aperture, for the introduction of food, similar to what occurred accidentally in Alexis St. Martin. The operation is feasible in theory, and simple in performance. But its extension to cases of hopeless malignant disease seems scarcely expedient.[1]

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[1] From *γαστηρ*, stomach; and *στομα*, mouth.

Gastrotomy.

When the bowels are obstructed from an internal cause, beyond reach from the outlet, a question arises as to the expediency of performing gastrotomy, with a hope of relieving the obstruction. If that depend on bands of lymph, or on intussusception, a simple manipulation might suffice to liberate the affected part. But the difficulty of diagnosis, and chance of failure, besides the danger of the operation, conspire to enforce great caution in resolving on such serious procedure. At the same time, when all ordinary means have failed, when several days have elapsed, and when the case is otherwise certainly hopeless, the doubtful chance of the operation may be afforded; more especially when pain, and other symptoms, point somewhat plainly to some part of the abdomen as the probable site of obstruction. At that part the incisions are made; with the precautions already spoken of. It may happily be in our power simply to disentangle and relieve; or, at the worst, the distended bowel may be evacuated by puncture, and an attempt made at establishing the condition of artificial anus. Of twenty-seven patients operated on, Mr. Phillips mentions thirteen, whose lives have been preserved.[2]

Affections of the Diaphragm.

Surgically, the diaphragm may be affected by *penetrating wound.* This may prove fomidable by hemorrhage, or by inflammation, and has to be treated accordingly; or, those dangers avoided, an imperfect closure or weak cicatrix may invite protrusion of the abdominal contents at the weak point,[3] more especially when that happens to be on the left side; and this may be followed by a sudden crisis induced by strangulation of a diaphragmatic hernia; or, from simple misplacement, the thoracic organs may suffer chronic disorder, not without a risk of ultimate asphyxia.

Rupture of the diaphragm may be produced by external injury or violent muscular effort. The risks by consequent misplacement of the abdominal organs are as in the former case. Such malposition is usually indicated by an anxious expression of countenance, a sunk empty state of the abdomen, corresponding fulness in the chest, thoracic percussion unusually clear or unusually dull, auscultation affording borborygmi rather than respiratory murmur, with obscuration of the sounds of the heart. In treatment but little is in our power.

Should *paralysis* of the diaphragm coexist with ascites, obviously great care is specially necessary in withdrawing the fluid by paracentesis, lest dangerous collapse occur.[1]

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[1] Sedillot, Gazette Medicale de Paris, Jan. 1847; and Monthly Journal, April, 1848, Retrospect, p. 68.

[2] Phillips, Med. Chir. Transact. vol. xxxi, Lond. 1848; also Brit. and For. Rev. April, 1849, p. 433.

[3] Mr. Guthrie is of opinion that a wound made in the diaphragm never heals by closing.

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[1] Von C. W. Mehliss, die Krankheiten der Zwerchfells des Menschen, Eisleben, 1845: also British and Foreign Med. Rev. July, 1847, p. 166.

Travers, Inquiry into the Process of Nature in Repairing Injuries of the Intestines, &c. Lond. 1812. Scarpa, on Hernia, by Wishart, Edin. 1814. Lizars, Observations on Extraction of Diseased Ovaries, Edin. 1825. Fingerhuth, Dissertatio de Vulnerum in Intestinis Sutura, Bonn, 1827. Weber, de Curandis Intestinorum Vulneribus. Reybard, Mémoires sur le Traitement des Anus Artificiels, &c., Paris, 1827. Jobert, Traité des Maladies Chirurgicales du Canal Intestinal, Paris, 1829. Velpeau, Mémoire sur l'Anus Contre Nature, &c., Paris, 1836. Dupuytren, de l'Anus Contre Nature, &c. Leçons Orales, &c. vol. ii, p. 193. Lawrence on Ruptures, Lond. 1838. Teale, Cyclop. of Practical Surgery, article *Intestinal Fistula*, Lond. 1841. Phillips, Med. Chir. Trans. vol. xxxi. Clay, Cases of Peritoneal Section for the Extirpation of Diseased Ovaria, &c. Medical Times, vol. vii, pp. 43, 59, 67, 83, 99, 139, 153, 270. Phillips, Med. Chir. Trans. vol. xxvii, p. 473, 1844. Lee, on Tumors of the Uterus and its Appendages, Lond. 1847. Bright, Guy's Hospital Reports. Boivin and Duges, Diseases of the Uterus, &c. Cruveilhier, Anat. Pathol. livrais 5, &c. Seymour, on Diseases of the Ovaria. Nauche, Malad. Propr. aux Femmes. Lee, Cyclop. of Pract. Medic. art. *Diseases of the Ovary*. Simpson, Library of Medicine, vol. iv. Erichsen. on Ovariotomy, Assoc. Journal, Jan. 13, 1854. [Lyman, Prize Essay on History and Statistics of Ovariotomy, Boston, 1856. Duncan, "Is Ovariotomy Justifiable?" Lancet, Feb. 1857, also Am. Jour. Med. Sci. April, 1857.]

CHAPTER XXVIII.

HERNIA.

By Hernia is understood a protrusion from within an internal cavity, of part of the contents of that cavity. But the term is usually limited to the most frequent form of such protrusion—namely, that from the cavity of the abdomen. And of this Hernia there are varieties, according to the site of the protrusion: Inguinal and Ventro-inguinal, Femoral, Umbilical, Ventral, Phrenic, Perineal, Vaginal, Labial, Obturatorial, Ischiatic. These, again, may vary according to the anatomical relation of their parts—Congenital, Infantile; and according to the parts protruded—Enterocele, Epiplocele, Entero-epiplocele, Hernia Litrica. And, further, other varieties depend on the pathological condition of parts—Reducible, Irreducible, Incarcerated, Strangulated.

The *Causes* of Hernia are predisposing and exciting. Whatever weakens the abdominal parietes at any point, predisposes to protrusion at that point;—natural want of closeness of development, as at the groin and navel; rupture of muscle and fascia, at any part, as in parturition; atrophy of muscle, following bruise; penetrating wound. Again, whatever tends to propel the abdominal contents with unusual force against such weakened or predisposed parts, directly excites or causes the protrusion; as violent coughing, straining at stool, or severe muscular exertion of any kind. And, further, the predisposing and exciting cause may be the same. Cough, straining, or habitual exertion of the abdominal muscles in any way, when long continued, tend to weaken and enlarge the natural outlets of the cavity, by constantly propelling the abdominal contents against the parietes—and thus prove predisposing. And then some sudden cough or strain effects protrusion, and proves the exciting cause. Hence it is, that old men with coughs and urinary complaints, sailors, gymnasts, &c., are especially subject to the ordinary forms of this disease.

The component parts of the tumor vary according to the nature of tho protrusion. But, generally, they may be stated to consist of Coverings, Sac, and Contents.

The *Coverings* are far from uniform; differing in the varieties of Hernia, and being seldom exactly the same in any two cases. In inguinal and femoral hernia, for example, the coverings differ widely; and in each of these affections, the density, thickness, and even number of the investing layers, depend very much on accidental circumstances. In operating, it is vain to look for an unvarying sameness in this part of the tumor. In all cases of ordinary hernia, however, there is first the usual integument, and then one or more layers of fascia. These will be enumerated, in the separate consideration of the varieties of hernia.

The *Sac* is the portion of parietal peritoneum which is pushed before the protruding viscus, and which forms its immediate envelope. Sometimes it is wanting; as in hernia following directly upon wound, and in the congenital form of the disease. In the great majority of cases, we are to count upon its presence—adherent or not to the extra-abdominal parts with which it is in abnormal contact, according to the duration of its presence there, and the occurrence or not of plastic exudation of its exterior. We ordinarily speak of the neck and body of the sac, as we do of the neck and body of the general tumor; the neck being that portion, of smaller calibre, which is at and near the aperture of protrusion, and the body being understood to be the more globular swelling beyond. If the tumor have been long protruded, without reduction, and otherwise but little altered in its circumstances, the neck of the sac is apt to become dense and unyielding in structure, and the calibre in consequence is at that part of a fixed nature. When, under the application of a fresh exciting cause, a new protrusion takes place, there is an extension in the sac, corresponding to the increased bulk of its contents; but, not improbably, the propelled original neck of the sac does not change, except in its position only; and, remaining of its contracted dimensions, it may become the seat of stricture in the case of strangulation—the new neck proving comparatively free and accommodating. This circumstance has obviously an important bearing on the operation for relief of strangulation.

The Hernial Contents are various, inasmuch as every abdominal viscus is liable to protrusion; but the most frequently affected, by far, are the intestines and omentum; one or other, or both. If intestine alone is protruded, the tumor is said to be an *Enterocele; Epiplocele* implying descent of omentum; and *Entero-epiplocele,* descent of both. Sometimes only a redundant portion of bowel escapes, in the form of a diverticulum; and this is termed a *Hernia Litrica.*

The *Diagnosis* of hernia is a practical subject obviously of the highest importance. Ordinarily, a hernia is found to be a soft tumor, at the site of an abdominal aperture, receiving an impulse on coughing, and tending to enlargement under exertion of the abdominal muscles in any way, gurgling under pressure if containing bowel, and capable of being replaced, by pressure, within the abdominal cavity. There are certain affections for which such tumors are especially liable to be mistaken. 1. *Hydrocele* simulates the oblique inguinal hernia; but is to be distinguished thus: Hydrocele is generally more or less translucent, and hernia is almost always opaque; the exception being, when in a large hernia, invested by thin integument, a fold of bowel alone descends, capacious, and filled only with gaseous contents. Hydrocele is a constant tumor, unaffected by pressure; hernia is ever varying by accidental circumstances, and is usually capable of being diminished by pressure, if not made wholly to disappear. The apex of the pyriform swelling, in hydrocele, simulates the neck of the hernia; but, on careful manipulation, it is found to terminate beneath the abdominal outlet, leaving always some part of the cord clear; and the cord is never at any part clear in unreduced hernia. The hydrocele, unless congenital, has no impulse, and evinces no tendency to enlargement, on coughing, or other exertion of the abdominal muscles. The testicle is felt obscurely, if at all, in hydrocele; in scrotal hernia it is usually found, distinct and separate, at the lower part of the scrotum. The history of the case, too, is widely different; the hernial tumor appears suddenly, and proceeds in development from above downwards; the hydrocele is of gradual formation, and its progress is from below upwards. Not unfrequently, however, be it remembered, Hydrocele and Hernia coexist. 2. *Hydrocele of the Cord.*—This is usually a circumscribed swelling, leaving a portion of the cord clear, above and below, as may be ascertained by careful manipulation; it is not reducible; and it evinces the ordinary negative signs on coughing or other exertion. When the portion of cord within the inguinal canal is affected by circumscribed serous accumulation, however, the diagnosis may become of great difficulty, as can readily be understood—resting mainly on the reducibility or irreducibility of the tumor. 3. *Cirsocele.*—Ordinary varix of the spermatic veins, and veins of the scrotum, can scarcely be mistaken for hernia; the cord is comparatively clear, the feel of the veins is marked and characteristic. Like hernia, there is diminution of the swelling during recumbency, and on pressure; but, unlike hernia, there is return of swelling, on resumption of the erect posture, and on abdominal exertion, though the thumb be kept accurately and firmly placed on the abdominal outlet. When there is a swelling, however, at the upper part of the cord, partly within the inguinal canal, and consisting of enlarged veins—perhaps with some serous accumulation—diagnosis is difficult; for the form and history of the tumor are very like those of hernia, and there is an impulse on coughing. We trust to non-reducibility of the entire swelling, and its characteristic feel; on pinching it, the veins roll like earth-worms between the finger and thumb, and the touch of the experienced is usually able to detect the absence of all abdominal descent. This swelling, however, often paves the way for hernia by dilating the canal, and thereby facilitating protrusion. 4. *Bubo.*—The history, progress, form, and feel of bubo must obviously differ very much from those of hernia. The two may be combined, however; a patient afflicted with inguinal hernia, or femoral hernia, may have enlargement of the inguinal glands. 5. *Descent of the Testicle.*—The testicle, descending at an unusually late period, may be arrested in the inguinal canal, causing a painful swelling there very similar to hernia. It is known, by absence of the testicle in that side of the scrotum, by the feel of the tumor, and by the characteristic pain which is experienced on pressure being made on the part. Like the high form of Cirsocele, it may be the precursor of hernia; a portion of bowel or omentum slipping down behind the testicle, through the abnormally dilated canal. 6. *Sarcocele.*—This is readily distinguished by the history and progress of the tumor, its feel and form, and its negative signs on coughing; the cord too is free, except in some cases of malignant disease. 7. *Psoas abscess* is distinguished from femoral hernia; by the evidences of spinal disease, by the history of the case, by distinct fluctuation in the swelling, and by the progress of "pointing;" and most frequently the site of the abscess is exterior to that of hernial protrusion. 8. *Varix of the femoral vein.*—A bulging varix of the femoral vein projecting through the saphenic opening, may very readily be mistaken for femoral hernia. The test is simple. Reduce the swelling by pressure in the recumbent posture, and then press firmly on the abdominal outlet; if the case be one of hernia, there is no reproduction of tumor; if it be varix, the swelling quickly reappears.

Reducible Hernia.

At some part of the abdominal parietes, a swelling forms; painful; sudden, usually after some unwonted exertion; at first slightly tense, and tender; afterwards soft, compressible, and tolerant of manipulation; increased by the erect posture and by abdominal exertion—and then, too, sustaining an impulse, when held; capable of being reduced, by pressure made in the direction of the outlet through which it has come; often disappearing spontaneously, on recumbency being assumed. An enterocele is smooth, elastic, and more or less globular in form; it gurgles on pressure, and flatulent noises may be emitted spontaneously; reduction, under pressure, is preceded by gurgling, and is often abrupt—taking place *per saltum*. Epiplocele is doughy, and more irregular in form; it emits no noise; and reduction is slow and gradual.

The treatment of reducible hernia may be regarded as analogous to that of dislocation; consisting of prevention, reduction, and retention. Not unfrequently there are premonitory symptoms of protrusion, and then *Prevention* is in our power. Pain and slight fulness appear at an abdominal outlet, after unusual exertion. Hernia is about to form. In order to avert it, the exciting cause is removed, by discontinuing all abdominal exertion, as much as possible. And the predisposing cause is met, by a well-fitted, lightly-springed truss being worn on the part, so as to strengthen what is weak in the parietes, while at the same time a mechanical obstacle is directly opposed to protrusion.

Should hernia actually form, replacement, or *Reduction*, cannot be too soon effected; inasmuch as the parts protruded are ever liable, from apparently but slight causes, to the supervention of strangulation—a state fraught with the utmost danger to life. To leave a hernia unreduced, and at the same time to continue any laborious avocation, or even to be exposed to but occasional abdominal exertion—is to convert a comparatively unimportant disease into one of a grave character, and to render a life, otherwise good, dependent on a very slender tenure. In life insurance, for example, an applicant affected with a slight but well-trussed hernia is admitted, if in other respects suitable, with only a trifling addition of premium; while he who, with as simple a hernia, and of equally good health in other respects, neither wears a truss, nor otherwise provides against descent, is unhesitatingly rejected.

Reduction is effected by placing the patient recumbent, slightly elevating the trunk, removing all outward pressure from the abdomen, and in short taking every means to relax the abdominal parietes; then gentle and steady retropellent pressure is made with the hand, in the direction whence the descent has come. Such manipulation is termed the *Taxis*.

Retention is effected by continued and suitable pressure at the site of protrusion; and this pressure is best made by means of a truss; a steel spring, with a compressing pad at the extremity. Of these instruments many varieties have been constructed; but, of late, opinion seems to have inclined, very justly, towards a decided preference for the simple spring with its ordinary cork pad; provided that the instrument is accurately adapted to each individual case; the pad fitting nicely to the abdominal outlet, not too conical lest permanency of dilatation should be so maintained, and yet not so flat as unnecessarily to diffuse the pressure; the spring passing about two inches beneath the crest of the ilium, grasping there firmly, and terminating a little way beyond the spinous processes of the lumbar vertebræ; the spring not so strong as to gall the parts by inordinate pressure, and yet strong enough to shut up the opening effectually; a thigh strap passing from the back part of the spring to the pad, so as to prevent that from being displaced upwards; and, to avoid chafing, a piece of folded lint or linen being interposed beneath the instrument, at the site or sites of pressure. At night, the truss may be removed, on the patient lying down in bed. In the morning it is the first article of dress to be adjusted; great care being always taken in regard to two points—1, that the pad fits accurately; and 2, that there is no descent, however slight or partial, during its application. Should at any time reprotrusion occur, the instrument must be instantly removed, and means as instantly taken for replacement and accurate readjustment.

By careful and constant use of the truss, a radical cure is expected in the child. The predisposing cause is permanently removed; for, descent being prevented, further dilatation of the outlet does not occur; and, during the general development of structure, the aperture or canal comes to acquire the normal proportion and capabilities. The period during which the truss requires to be worn, for attaining this end, is considerable; from one to three, or more years. In the adult, so fortunate an issue is not to be hoped for; the outlet remains dilated, and predisposed to re-descent, on application of but a slight exciting cause; usually the truss must be worn for life. And yet, a happy incident may occur, in favor of a better issue. Thus, we have seen a phlegmon form under the pressure of a galling pad; the abscess discharged, contracted, and healed; and, on cicatrization, it was found that the extent and site of plastic exudation had been such as to consolidate the outlet, and render further use of the truss quite unnecessary. And even without such accidental aid, it sometimes, though rarely, happens that a slight hernia disappears under temporary use of the truss, and does not return.

As, in the adult, the truss, however carefully and patiently worn, generally proves but a palliative, *Radical Cures* have naturally been sought for with some avidity. Of these, several have been applied to the inguinal hernia. What seems the best method is, to adopt the principle of subcutaneous puncture; making several scarifications in the neck of the sac—the cord carefully protected—and then applying accurate pressure over the canal, so as to favor occlusion of its unoccupied part by plastic exudation. Another method is by invagination; pushing a fold of integument into the canal, after reduction of the tumor; retaining the invagination by a suture, at the upper part; and obtaining afterwards adhesion of the invaginated portion of integument, by pressure, after excoriation by means of ammonia. This, however, is found to be both more uncertain, and more unsafe, than the former mode. And neither should be attempted, unless in extreme cases, and at the express desire of the patient; seeing that neither is quite free from risk by excess of the inflammatory process. The application of iodine to the neck of the sac has been tried, by puncture and injection; but this method does not seem more promising of success than the other.[1]

Irreducible Hernia.

A hernia is said to be irreducible, which cannot be reduced, and is permanently fixed in its extra-abdominal position. This state may be caused—1. By adhesion of the sac, on its external aspect, to the parts into which it has been protruded; and by adhesion of its internal surface to the hernial contents. In the neglected hernia of any considerable duration, the former event seldom fails to take place; and to constitute the second, plastic exudation has only to occur on the opposed surfaces. 2. By the nature of the protrusion. The caput cæcum coli is uncovered by peritoneum posteriorly. It may slide down through the parietes; and, presenting at the groin, it may constitute an irreducible tumor—as well as a hernia without a sac. The areolar adhesions of the displaced gut have been extended and shifted but not broken; and they may present an insuperable obstacle to replacement. But it has happened otherwise. The bowel may have a more extensive peritoneal investment than usual; and, instead of merely descending with its fleshy connections, may acquire a complete mesentery—so becoming easily reducible.[2] 3. By contraction of the abdominal cavity. When a large hernia has been long unreduced, it may become permanently irreducible, although no adhesion form between the contents and the sac. The abdominal cavity, having parted with a large proportion of its ordinary contents, contracts upon the remainder; and then there is found to be no room for replacement of the extruded parts, even were circumstances quite favorable for such reduction.

Irreducible hernia are predisposed to evil. The patient usually suffers from flatulence, indigestion, and constipation. The peristaltic movement of the protruded bowels is imperfect, and to other causes of incarceration and strangulation the part is constantly exposed. Such cases, therefore, require to be watched with unusual care. The bowels are to be carefully regulated; all excitants of intestinal disorder are to be avoided, as well as unnecessary abdominal exertion; and a bag truss must be constantly worn, so as both to support the protruded parts, and prevent the occurrence of further protrusion. No direct interference is warrantable, with a view to remove the obstacles to reduction. But, should strangulation occur, the ordinary operation is to be performed, for relief of the constriction.

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[1] Bigelow, Boston Medical and Surgical Journal, Dec. 1850.

[2] Lancet, No. 1235, p. 462.

Incarcerated Hernia.

This term denotes a temporary retention of the parts in their abnormal position, without obstruction to the fecal flow, and without the occurrence of inflammatory disease. No urgent symptoms call for reduction; but when this is attempted, it is found to be impracticable under existing circumstances. There may be—1. An enlargement of the hernial contents. The gaseous matter may have become expanded; the fluid and solid contents may have accumulated in unusual quantity; or a portion of extruded omentum may have slowly expanded by increased deposit of adipose tissue; and the tumor—thus enlarged—is too bulky to repass the outlet. Or, 2. While the tumor may be but little changed, the aperture through which it came may be temporarily contracted—preventing replacement, yet not causing constriction and strangulation; and this state may depend on muscular spasm, or on swelling of the parts connected with one or other of the various stages of an advancing inflammatory process.

Treatment depends plainly on the cause. Gaseous contents are diminished by the continued application of cold; solid and fluid, as well as gaseous contents, may be favorably acted on by purgatives and enemata; a fatty omentum may be diminished by pressure and starvation; and, then, the reduced tumor may be pushed back within the abdomen. Spasm is overcome by the warm bath, opium, chloroform, or other antispasmodics; inflammatory exudation is got rid of by antiphlogistics, followed by discutients; and through the cleared outlet a comparatively unchanged protrusion may again be passed. Until this desirable event can be achieved, the part ought to be supported by a bag-truss or otherwise; and every precaution should be taken to avert the occurrence of strangulation—to which such tumors are especially liable.

Strangulated Hernia.

Strangulation is said to have taken place, when fecal flow is arrested in the hernial tumor by tightness of constriction at the neck; and when, usually from the same cause, circulation has been disturbed in the protruded parts, and the inflammatory process is begun. Or the condition may be otherwise defined to be:—incarceration, with interruption to both the fecal and the vascular flow, and with an inflammatory process in the protruded parts either following or preceding constriction. For this state of matters, the hernial contents are usually to blame. The constriction may depend on spasm, or other alteration in the abdominal outlet; but much more frequently it is caused by sudden, or at least rapid and unusual, enlargement of the protruded parts—in consequence of which, the neck of the tumor becomes, as it were, jammed at the aperture of descent. A fresh protrusion takes place; or feculent con-fæces accumulate: or gaseous contents become increased; or an inflammatory process is begun in the protruded parts, causing both engorgement and serous effusion. Much more frequently, however, the inflammatory accession is consequent to constriction—indeed caused by it.

The symptoms of strangulation are very marked. The patient is annoyed by flatulence and general uneasiness. The bowels refuse to act; the contents of the lower bowel may be evacuated, but no dejection can be obtained from above the seat of stricture; yet frequently there is a troublesome and urgent desire to go to stool. The tumor is found incapable of reduction: at first it may be flaccid, but it soon grows tense, and tension rapidly increases. Pain is felt in the part; on the increase, and extending towards the abdomen. Sickness comes on, with retching. Then the stomach is emptied: and, vomiting continuing, the upper bowels also eject their contents: the peristaltic movement comes to be wholly reversed, and the vomited matters are stercoraceous. At first the pulse may have risen to the sthenic and inflammatory character; but now it becomes of another type—denoting the state of Constitutional Irritation, and tending fast to lapse into the typhoid character. The tumor becomes more and more tense and painful—perhaps intolerant of even the gentlest pressure. Great pain affects the whole abdomen, with aggravation and twisting at the umbilicus. Nausea and vomiting continue; the countenance is anxious, pale, pinched, and wet with clammy perspiration; there is great restlessness, and distress is constant; the pulse grows rapid and indistinct: hiccoughing sets in: the tumor becomes less intolerant of manipulation, less tense and painful, and feels doughy and crepitant on being handled. Gangrene has taken place. Then vomiting may cease, and sudden cessation of pain and discomfort may be experienced; perhaps the bowels act imperfectly: and the patient may express himself not only relieved but confident of recovery. Sinking, however, continues; and the fatal issue is not long deferred.

Such is the ordinary course of a strangulated hernia, unrelieved. But there may be another and less formidable termination. In the progress of the case, the integument and other envelopes of the tumor become involved in the inflammatory process: at first they are bright red, tense, and very painful: afterwards darker in hue; less painful and tense, cold, phlyctenulous—in fact gangrened. The contents are in a similar condition. All slough. And, on separation of the mortified parts, copious feculent discharge takes place; relief follows immediately; the urgency of the symptoms is over; and gradual recovery may ensue, with the establishment of artificial anus.

In the preceding enumeration of symptoms, we have first the signs of obstruction, and then those of inflammatory accession, in the protruded parts. But this may be reversed. The inflammatory process may be the original affection; caused, perhaps, by a blow—though a less direct and palpable exciting cause may suffice. The tumor is painful, and red, and swollen, even for some time, while as yet the abdomen is free from ailment, and the bowels are working naturally. The pain and tension are chiefly at the body of the tumor, in the first instance, instead of at the neck as in primary constriction. But, the inflammatory process continuing, engorgement with effusion takes place, the bulk of the whole tumor is increased, in consequence constriction occurs; and then follow obstruction of the bowels, affection of the abdomen, and aggravation of the local disorder.

The rate of progress varies according to circumstances. When the tumor is small and recent, constriction is usually tight; and, in a few hours, death of the parts, at least if unrelieved, is certain. Whereas, if the hernia be of some size and long standing, and if obstruction precede the inflammatory process, and neither prove urgent, days may elapse ere much mischief be done to either part or system. On the average, however, it is not by days, but by hours and minutes, that the registration of time is made in cases of strangulated hernia. And, by the practical man, these minutes are invariably regarded as of vital importance.

Many if not all of these symptoms may exist, independently of either hernia or strangulation. Whenever they do occur, however, hernia is invariably to be suspected, and the necessary inquiry and examination should be made under all circumstances. There may be no tumor found at the ordinary sites of protrusion, or at any other accessible part of the abdominal parietes; then it is probable that the symptoms are independent of herina—purely abdominal. If a hernia is discovered, of old standing and considerable size, not very tense or painful; if the pain is not greater in the tumor than elsewhere—perhaps not so great; if the bowels are acting, though perhaps imperfectly; if, on inquiry, it is ascertained that the abdominal and general symptoms plainly, and by some considerable time, preceded change in the tumor;—then the probability is, that the affection is enteritic or peritonitic, originating in the general abdomen, affecting the tumor secondarily, and perhaps even in a minor degree. When, however, the signs of strangulation are found marked and acute, and the history plainly indicates precedence of the local and extra-abdominal signs of disorder, there need be no doubt that the case is of the ordinary kind—the urgency essentially dependent on strangulation of the hernia.

Treatment of strangulated hernia necessarily varies according to the nature of the case. In general, it may be said that our object is to effect reduction as speedily as possible; saving structure, by favoring decline of the inflammatory process; restoring the normal passage of the intestinal contents; and arresting the disastrous progress of constitutional disturbance. But it is not always good practice to have recourse to the manipulations for reduction immediately; and, in regard to this practical point, the cases may be divided into two great classes: those which are preceded by inflammatory change in the hernia, and those in which this follows on constriction otherwise produced. The latter, doubtless, are the majority. In the former, it is the natural and proper course of procedure to remove the cause of constriction, if possible, in the first instance—provided the case is chronic enough to admit of this; leeches are applied, and other suitable antiphlogistics are enforced; and when, by such means, the bulk of the tumor has diminished, and the parts have also acquired a better tolerance of manipulation, then reductive pressure is to be applied—without risk of doing harm, and with a good prospect of proving successful. The inflammatory change has caused constriction;

[illegible] But in the [illegible] The constriction [illegible] of the former, [illegible]

[illegible] apply [illegible] otherwise, the [illegible] may interfere seriously [illegible]

[illegible] and with the [illegible] parietes to the [illegible] and that no band- [illegible] the abdomen. The [illegible] and while [illegible] and body of the [illegible] and at the same time push- [illegible]—a kneading [illegible] of the tumor by the fingers [illegible] the part most compacted [illegible] same time, pro- [illegible] aggravation of pain and [illegible] contents back, not [illegible] protruded. The [illegible] prevent him from [illegible] to the operator. [illegible] the pressure: and it is [illegible] too long—that is, [illegible] passed and when its main- [illegible] aggravation of the crescent in- [illegible][1] [illegible] applicable at all; when, for [illegible] great progress ere assistance [illegible] of pressure, as to [illegible] the apprehension of texture giving way [illegible] also, when we are satisfied that inflammatory change has already gone so far as to render loss of substance, either by ulceration or by sloughing, inevitable in the constricted parts.

Sometimes benefit accrues from an opposite direction of gentle force, previous to the reductive application of it: bringing down the jammed neck from the abdominal aperture and so favoring a clearance of the passage by an unravelling, as it were, of its contents; causing, in fact, a slight increase of the descent, before the whole is attempted to be replaced. A bluff forcing of the fundus of the tumor on its neck is especially to be avoided, when replacement is intended; for the effect of this, in the case of protruded bowel, is not only to jam the parts yet more, but actually to favor formidable accession to the tumor's bulk by traction from the aperture downwards.

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[1] By some it is thought that much may be done by position alone; flexing the thighs, rotating the limbs inwards (for inguinal and femoral hernia—especially the latter), raising the nates till the whole weight rests on the shoulders, retaining this position for a time, then lowering and raising again, the hand of the surgeon meanwhile making gentle pressure on the tumor. It is thought that the posturing tends to pull the contents out of their sac.—Brit. and For. Rev., April, 1850, p. 491.

[2] For a sample of the injuries done by imprudent taxis, see Teale on Hernia, p. 96.

Failing in the well-applied taxis, we naturally look for *Auxiliaries* to it; and we find a catalogue of these, analogous to the aids of reduction in dislocation. Some act on the contents of the tumor, tending to reduce bulk; others affect the abdominal outlet, tending to enlarge space; and the latter act well, not only in those cases in which spasm of the abdominal parietes is the cause of constriction, but also in those in which the abdominal outlet may be of the ordinary dimensions, yet quite unfit for return of the impacted textures which it happens to contain; in other words, they are of use in relaxing muscular fibre, not only in a spastic but also in a normal state—making easy room, either way, for replacement of the dislocated parts. And here it may be stated, that though in many cases the abdominal outlet is in the first instance free from change, and constriction depends on alteration in the contents; yet, strangulation having occurred, the abdominal parietes at the site of the hernia become involved in perverted action, and sooner or later are irritated into spasm. And hence it is, that the most useful auxiliaries are such as tend to abdominal relaxation.

1. *Venesection* is advisable in but a few cases;—in the comparatively young and robust, of inflammatary tendency, tolerant of loss of blood; with a tight strangulation yet recent, marked signs of advancing acute disease in the parts, and the constitutional symptoms still evincing a sthenic type. In such cases, bloodletting—one copious and rapid abstraction, from the arm—is of use by both combating this advancing affection, and at the same time tending to cause complete prostration of the muscular system—the abdominal parietes of course included. 2. The *warm-bath* has similar tendencies; and is obviously more generally applicable, inducing temporary depression; gaining the desired end, yet saving the system from actual loss. If there be time, this is one of the best means of assisting the taxis. The patient is placed recumbent in the bath, with the abdominal parietes relaxed by posture; and, when faintness is beginning to be complained of, the taxis is resolutely applied. It may fail; but the opportunity by the bath is not yet over. Let the patient be replaced in bed; in a few minutes he will be found deluged in perspiration, with a muscular system more prostrate than before; and then the taxis is most likely to succeed. 3. *Fomentation* is inapplicable; by rarefying the gaseous contents, and favoring exudation, it increases the bulk of the tumor; and it is too feeble and limited in its relaxing effect, to act favorably on the abdomen. 4. *Antimony*, as a nauseant and prostrating agent, is very inferior to the bath; adding greatly, and in a dangerous degree, to the irritability of the stomach, and to the downward tendency of the constitutional symptoms. It is inapplicable. 5. And, for a like reason, let *Tobacco* be used very warily, if at all. By other, less hazardous, and more manageable auxiliaries, our object may be speedily obtained. 6. *Opium* is deservedly in much higher repute; following bloodletting in the marked cases of an inflammatory nature, given singly in others; the dose a full one, not less than two grains—for the adult. The beneficial effect is twofold. Constitutionally, the system is rendered more tolerant of the depressing effects of strangulation; the remedy being in fact equally useful here as in the

case of intense abdominal inflammation unconnected with hernia (*Principles*, [illegible] Am. Ed. p. [illegible]). Locally, very great service is obtained by [illegible] so soon as the full narcotic effects of the drug have been established. This requires time, however; and consequently opium, like the warm bath, is not applicable to all cases—at least as an auxiliary of the taxis; for in all there is not time to await the operation of the remedy. 7. Chloroform, as has elsewhere been stated, is almost equally serviceable here as in dislocation; producing thorough relaxation, not aggravating collapse, quickly passing off, and leaving no unpleasant trace behind. 8. *Clysters of acetate of lead*, each containing ten grains dissolved in about six ounces of water, have been employed with success, repeated if necessary, every two hours.[1] 9. *Purgatives* are in all cases of strangulation most unwarrantable. The bowel is locked; and the stimulus of purging, quite unable to undo the locking, acts but injuriously in applying a stimulus which cannot be obeyed, and aggravating an already present inflammatory process. In the case of incarceration, the wary use of purgatives is often serviceable, in unloading the protruded bowel; but in the tighter degree of constriction, causing strangulation, they are never to be thought of. 10. *Enemata*, however, have a different character. When simple and bland, however freely and largely administered, they have not the pernicious properties of purgatives—more especially of those which are drastic and given by the mouth. Besides, they are positively of use, by disburthening the lower bowels of their contents, both solid and gaseous; and so making room within the abdominal cavity for reception of the extruded parts. And experiment would also lead us to suppose that they have a mechanical tendency to extricate, by exciting traction, from within, on the constricted and protruded bowel.[2] 11. The long elastic *Rectum-tube* is also both safe and useful, when passed high and cautiously, so as to reach the colon; the object being to evacuate the gaseous contents of the lower bowels more thoroughly than enemata can do, and so to make room within the abdomen. But, obviously, such a proceeding is only applicable to those cases in which distension of the lower bowels exists. 12. Some auxiliaries affect the tumor mainly. Certain cases, we have already seen, render it necessary that local bloodletting should precede the taxis. Fomentation has been thought of, but is found worse than useless. The application of *Cold* is sometimes of the greatest service. Applied indiscriminately, it will do harm; but limit its use to those cases which are chronic in their progress, in which the signs of obstruction plainly precede those of inflammatory change, and in which the inflammatory process affecting the tumor is not only slight but scarcely begun—then the effect is often most favorable. The gaseous contents being condensed, bulk is diminished; muscular energy is probably somewhat lowered, and space is gained; and, perhaps by puckering the investments of the tumor, some little reductive pressure may be so exerted. But act as it may, there is no doubt that the local application of cold tends wonderfully to assist the taxis, in the class of cases just described. It may be applied by sprinkling the tumor and surrounding parts with æther, and keeping up a continuously rapid evaporation by directing a current of air upon the part. Should this fail, great care must be taken for some time not to apply heat suddenly to the part, by fomentation or bath, or otherwise to cause rapid exaltation of temperature, for very obvious reasons. Ice and freezing mixtures are less suitable; being apt, by doing too much, to act injuriously on the hernia's contents. 13. *Acupuncture* has been proposed, when the constricted bowel is obviously distended by gaseous contents. But the use of cold is likely to obtain the same end, as effectually, and more safely. 14. *Posture* may be rather considered as a part of the taxis, than as auxiliary to it; so invariably is it to be attended to. It necessarily varies, in details, according to the site of the protrusion. Its main object is ever the same; to relax the parts through which reduction has to be made. In hernia at the groin, as already stated, it has been thought that elevation of the pelvis, with a hanging position of the recumbent body, has been of use in exerting an extricating traction on the strictured parts.

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[1] Brit. and For. Rev. Jan. 1845, p. 271.

[2] Lancet, No. 1035, p. 468.

The most available, and most generally used of these auxiliaries are: —bloodletting—local in all the inflammatory cases, and general in the few examples which admit of it; the warm bath; opium; chloroform; simple enemata, in large quantity; perhaps the long tube; in the chronic and uninflamed cases, always the local application of cold. If the taxis is to succeed, a yielding of the tumor is felt beneath the hands, the contents are plainly shifting; then a gurgling noise is heard, denoting replacement of the gaseous contents—always a welcome sound; and speedily thereafter the solid matters recede, sometimes very gradually, often as it were *per saltum*. A truss, or suitable compress and bandage, is instantly applied; the patient is confined to bed, recumbent; antiphlogistic regimen is strictly enforced; after some hours, an enema may be given, if the bowels have not acted spontaneously; but not till many hours should even the simplest purge be given by the mouth, it being well ascertained that the loop of bowel included in the stricture remains long in a paralytic state, and incapable of obeying the peristaltic stimulus. There is, in short, the same serious objection to purgatives immediately after reduction, as during the existence of strangulation. Should peritonitic or enteritic symptoms threaten, the usual antiphlogistic treatment must be had recourse to, both early and with energy. Not unfrequently, after tight constriction, discharge of blood takes place *per anum;* this doubtless being furnished by the mucus coat of the lately strangled part.

It may happen that under forcible application of the taxis, in a recent hernia, the tumor recedes suddenly, in mass. This is not desirable. For, it is not improbable that the untoward symptoms may continue, quite unchanged; the reason being, that the sac and its contents have been reduced together with their relations unaltered, and that the neck of the sac continues to constrict the omentum or bowel, as before. In such a case treatment becomes embarrassed. But most surgeons are of opinion that we are required to expose the abdominal outlet by operation, in search of the yet strangulated bowel; aiding that search by making the patient cough, or otherwise exert himself, so as to favor re-descent of the hernia. An operation under such circumstances is much more promising of success than Gastrotomy on account of an undefined internal obstruction. For in this case the cause of strangulation is plainly in the sac, and that is within reach at a fixed point, the parietal relations of the sac being likely to detain the reduced mass close to the site of protrusion.[1]

The operation for strangulated hernia is unhesitatingly to be had recourse to, so soon as the taxis, with such auxiliary means as seem advisable, has been fairly tried, without success. The great majority of experienced surgeons agree, that in regard to this operation error is more frequent on the side of delay than of precipitancy. Two circumstances demand its instant performance; a conviction that by no other means, than by the edge of the knife directly applied, can the abdominal outlet be so enlarged as to relieve constriction and admit of replacement; also, a conviction that already inflammatory disease has advanced so far, that either ulceration or sloughing is inevitable in the protruded parts. In the one case, we operate to relieve the stricture and effect replacement, hoping to arrest the inflammatory process; in the other, we operate to relieve the stricture, and, leaving the hernia unreduced, prevent fatal extravasation of intestinal contents within the abdomen—hoping also to limit the inflammatory attack to the directly implicated parts. The danger of strangulation is twofold; formidable disturbance of the system, and untoward inflammatory progress in the tumor. Both dangers advance, in most cases, with rapidity. And if we wish to meet them successfully, the measures of relief must be not only suitable but early; in other words, time, all valuable, must not be wasted in ineffectual attempts at the taxis, when the case at all partakes of an acute character. Large herniæ are more hopeful of reduction than the small; the inguinal protrusions are more hopeful than the femoral.

It has been proposed to relieve the stricture by means of subcutaneous section. But this proceeding is obviously so beset with danger and uncertainty as to be quite inapplicable.

The seat of stricture is exposed by careful and regular dissection; the incisions necessarily vary in their plan, according to the kind of tumor. Having cautiously divided the integuments and fascial envelopes, the sac is exposed, clear and glistening, resembling very much the peritoneal coat of the bowel; and there may be some difficulty in ascertaining whether it is the sac or bowel. By pinching it up, so as to show bowel separate beneath; or by observing serum, fat, or a portion of omentum between, we arrive at a sure diagnosis. But, this difficulty having been surpassed, another immediately arises. The sac having been exposed—or nearly so—are we to open it, examine the state of its contents, and divide the stricture from within; or are we to attempt division of this from without, leaving the peritoneum intact, and so escaping the danger of peritonitis? So long ago as 1720, Petit proposed this modification of the procedure—leaving the sac unopened; and the proposal has met with a varied reception since—inclining to distrust rather than otherwise. Lately, however, it has been revived under better auspices; and in suitable circumstances, it may be considered as the established and preferable practice. Were it applied indiscriminately, nothing could well be conceived more pernicious; bowel or omentum might be reduced when they ought not; or, one stricture having been relieved, another might be left—this second existing in the sac, perhaps below its proper neck, and continuing to embrace the hernial contents with fatal tightness after reduction. But, limit it to those recent cases of strangulation in which we are certain that the hernial contents are sound and reducible, and in which we are also certain that the only stricture is that which we propose to divide—then, doubtless, the extra-peritoneal operation is by much to be preferred. It is also suitable in cases of irreducible hernia, which have become strangulated; and in which, from their large size, the exposure of peritoneum may reasonably be expected to prove especially hazardous.[1]

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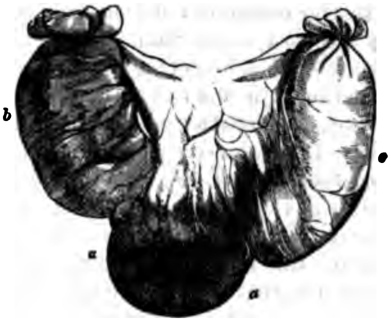
[1] Monthly Journal, Retrospect, Feb. 1849, p. 35.

If the case appear favorable for extra-peritoneal division, the investing textures are carefully divided at the neck of the tumor, so as to admit the point of the finger, or at least the finger's nail, within the tight orifice of the abdominal aperture; and then on the finger's point, so introduced, a probe-pointed bistoury is passed, and by it the necessary enlargement is effected. If the stricture be in the neck of the sac itself, even that may perhaps be relieved extra-peritoneally, by carefully scratching the outer part by the knife's point.[2] Then the taxis is applied; the parts are reduced—the contents going first, and gradually, otherwise stricture might remain after reduction; if the unopened sac be non-adherent, it is pushed back also; the wound is brought together; and, by suitable adaptation of compress and bandage, and avoidance of the ordinary exciting causes, reprotrusion is prevented.

But if it be deemed expedient to proceed in the ordinary way, the sac is pinched up by forceps; choosing a part where serum or fat interposes between it and the bowel—and that will generally be towards the fundus of small herniæ. By the knife's edge, held horizontally, the raised fold is divided. Through this aperture the point of the finger is introduced; and, on this, as the best director, dilatation of the opening is made to such an extent as may be deemed advisable. However large the hernia, the opening of the sac need not be of greater extent than what is merely sufficient for ascertaining the state of the contents, and permitting the finger to reach the site of stricture. The point of the forefinger having been passed up to the abdominal aperture, the probe-pointed bistoury is slid flatly along it; and, by the point's edge, pressed upon the stricture, this is divided to the necessary extent. Then the hernial contents, if sound and reducible, are replaced gently, portion by portion—the last protruded, first. Recent and tender adhesions may be gently broken up with the finger, or touched with the edge of

Fig. 190.



a a, The portion of bowel which has been protruded; constricted, dark, and engorged. At *b*, the upper, or cardiac portion, dilated, and of dark color. At *c*, the lower portion. comparatively empty, flaccid, and pale.

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[1] Indiscriminate performance of the extra-peritoneal operation must often lead to serious and fatal error. Selection must always be carefully made. For objections to the operation, *vide* Hancock, Observations on the Operation for Strangulated Hernia, Lond. 1850.

[2] According to Mr. Luke, the site of stricture may be ascertained previously to operation, by making impulse on the fundus of the tumor with one hand, while the other is placed on the neck. Wherever impulse stops, there is the stricture.—Med. Chir. Trans. vol. xxxi.

are united; but consolidated adhesions, if at all extensive, render the parts irreducible—they should not be interfered with. When there is any considerable portion of omentum in the sac, it should be carefully examined, to ascertain whether or not it conceals—perhaps strangles—a knuckle of intestine. If the sac be not adherent, it is replaced as well as its contents, but not along with them; for, reduction is found to be facilitated by an assistant's finger steadying and stretching the sac, while the contents are pushed upwards on its smooth and slippery surface. Reduction having been accomplished, the wound is brought together, and suitable pressure applied. Approximation by suture should not be complete, however; for union by adhesion is not desirable, otherwise danger might accrue from the secretions in the deep wound finding their way into the peritoneal cavity. They should be allowed a free outward drain.

When hernia is irreducible, we content ourselves with division of the stricture. If the contents are sound, the external wound is approximated with a view to adhesion. If the contents are found gangrenous, or verging thereto, the wound is left open, to permit free discharge of the feculent contents.

If on exposing the contents of a reducible hernia, the bowel be found merely congested; ruby-colored, it may be; perhaps spotted by points of ecchymosis, or showing one or more vesicles of the peritoneal coat—it is reduced unhesitatingly. If showing signs of plastic exudation on its surface, it may still be reduced; no structural change has taken place but what may be recovered from. But if the bowel be dark-purple at some parts, greenish at another, and perhaps ash-colored at a third, friable, and evidently fast passing into gangrene—under no circumstances is it to be reduced; else fatal feculent extravasation must ensue. And if omentum be found dark-red, emphysematous, and with its venous blood coagulated, it too must be left to slough in its outward site; in either case, however, as much care being taken to free the neck of the tumor by division of the stricture, as if the whole were fit for reduction. In the case of gangrened bowel, it is also well to incise the sloughing part, so as to relieve by immediate and copious feculent evacuation. Afterwards, the treatment is as already described for artificial anus. In the case of gangrenous omentum, two modes of procedure are in our option. We may cut off the gangrened part—having previously satisfied ourselves that there is no portion of bowel within the mass—secure the vessels by fine ligatures, and return all within the abdomen. Or, having cut off the gangrened part, and secured the bleeding points, we may leave the rest still impacted in the abdominal outlet, with a view to its becoming permanently fixed there, and so preventing all future tendency to protrusion. The former method—though not free from risk by bleeding and inflammatory exudation within the abdominal cavity—is usually preferred; the latter being often followed by uneasy sensations in the part, and proneness to abdominal disorder.

In all cases of doubt as to viability of the strangulated parts, reduction should at least be delayed. It is never to be forgotten, that notwithstanding relief and replacement, inflammatory disease may still advance in the bowel, so as to cause loss of continuity by ulceration. And if this take place within the abdomen, and be followed by feculent escape, the patient's doom is sealed.

Sometimes, after opening the sac, stricture at the ordinary sites is sought for in vain. In such cases it is likely to be found in the hernial contents themselves; a portion of omentum, for example, may encircle a portion of bowel. This is detected by careful manipulation; and is to be gently undone by the fingers—perhaps aided by a touch of the knife.

After successful reduction, by operation, the same treatment is required, as in the case of simple taxis; rest; recumbency; antiphlogistic regimen; leeching and other antiphlogistics,[1] if inflammatory symptoms supervene; hydrocyanic acid or creasote, if the stomach continue irritable; bland enemata; but no purge by the mouth, however simple, until many hours have elapsed—otherwise, as already stated, dilatation with obstruction will take place above the palsied portion of intestine, and the patient will probably sink under symptoms of ileus. If intestine previous to reduction have shown an advanced stage of the inflammatory process, antiphlogistics are especially necessary, both local and general, in order to avert if possible ulceration or other dangerous structural change.

When the case is of the obscure nature already described—and it is difficult to say whether the hernia is to blame or not for occurrence and persistence of the untoward symptoms—let the operation for relief of stricture be performed. When the tumor itself is of an ambiguous character, when we are not certain whether it is a hernia or not, and yet the ordinary symptoms of strangulated hernia are present—again let the surgeon operate. It is well that he should approach error on the safer side.

After operation, the greatest attention must be paid, for some days, to prevent reproduction of descent, by keeping the compress accurately applied, and avoiding the ordinary exciting causes. Should reprotrusion take place, by coughing, restlessness, or imprudence of the patient, the dressing must be instantly undone, and replacement effected. When the sac remains unreduced, simulation of redescent is apt to take place, by serous accumulation within the sac;—especially if the integumental incision be closed; but this state is at once detected and remedied, on opening up the wound. After cicatrization, a well-made truss must be worn as in ordinary cases; for it is seldom that the operation for relief of stricture effects a radical cure.

Oblique Inguinal Hernia.

This is by much the most common form of hernia, in the male. Descent takes place along the spermatic cord, through the inguinal canal; the tumor shows itself external to the parietes, at the lower aperture; and thence descends into the scrotum in the male—constituting an *oscheocele*, or scrotal hernia; into the labium of the female, constituting labial hernia. The investments of the tumor are as follows; externally, the integument; then the superficial fascia of the abdomen; then the proper fascia, or fascia propria of Camper, consisting of fibres from the tendon of the external oblique; then the fascia cremasterica, consisting of fibres from the cremaster muscle; then the infundibuliform or transversalis fascia, consisting of the fascia transversalis abdominis; lastly, the sac.

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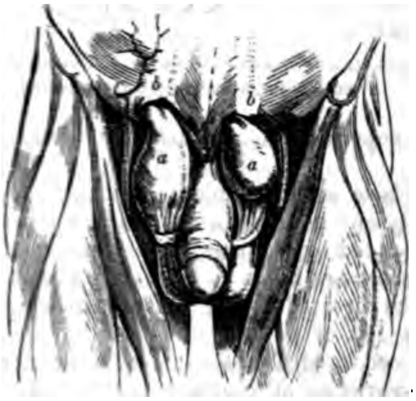
[1] Dieffenbach is afraid of calomel; supposing that it acts injuriously on the bowel, and is apt to induce an unhealthy state of the wound.—*Vide* his Operative Surgery, 1848.

As the tumor is about to descend, a painful fulness is found opposite the upper abdominal aperture, increased by abdominal exertion, and sustaining an impulse upon coughing. Then is the time for applying a truss carefully, and avoiding exciting causes, with a view to prevention of the hernia. The pad of the truss should compress the superior abdominal aperture, not the lower; otherwise there is room enough for hernia, and strangulated hernia too, within the abdominal parietes.

Fig. 191.

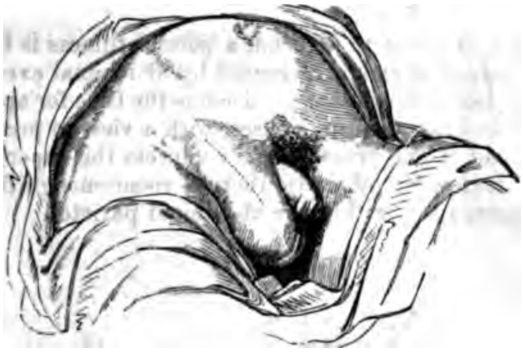


Plan of inguinal hernia: on the right side oblique; on the left direct. *a*, The hernial sac; *b*, The epigastric artery.—After Tiedemann.

To reduce this form of tumor, the pressure of the taxis is applied obliquely upwards and outwards, in the direction of the inguinal canal. In large tumors of old standing, however, it must be remembered that the canal becomes shortened as well as more direct—the two apertures coming to be almost opposite to each other; and this is attended to in the taxis. The patient is laid recumbent, with the trunk raised, and the thighs flexed and approximated.

In the operation for strangulation, a simple straight incision is made along the neck of the tumor; beginning a little above the aperture of protrusion, and extending downwards on the tumor, as far as may be deemed necessary. The deep cut, for relief of stricture, is made directly upwards; in order to avoid the epigastric artery, which courses behind and to the inside of the hernia's neck. The spermatic cord is usually behind, and out of harm's way; but sometimes it is split up and scattered over the neck of the hernia—and then caution is required, to avoid the spermatic artery and duct. The stricture may exist at one of three points; in the margins of the lower abdominal aperture; in the superior abdominal aperture; in the neck of the sac itself. Sometimes a double stricture exists; each abdominal aperture being at fault. The ordinary site is at the lower outlet; but if, after free division of this, reduction is still opposed, the superior site is at once to be suspected, and explored accordingly.

Fig. 192.



[Representation of the appearance of a large inguinal Hernia, and of the direction of the incision to be made in the operation. (From Fergusson.)]

At this site, it is to be remembered, a small strangulated hernia may exist, with scarcely any perceptible swelling; a minute portion of bowel being tightly embraced by the margins of the superior abdominal aperture. The symptoms are likely to be mainly those of enteritis, and attention may not be directed to the groin. In such circumstances the patient has great risk of perishing; unless, by sloughing and abscess, outward disharge occur, with establishment of artificial anus.

There are sub-varieties of inguinal hernia:—1. *The intermuscular Hernia.*—This is more liable to occur in females than in males; the bowel meeting with obstruction in its ordinary descent. Having passed the internal aperture, it turns towards the ilium, and lodges between the abdominal muscular layers, above and exteriorly to its point of exit. On account of this unusual site, diagnosis may be somewhat obscure.[1]

2. The *Congenital Hernia.*—This is a very simple deviation from the normal state of parts; dependent on imperfect development. It is not likely to take place till after birth; for not until after inflation of the lungs are the exciting causes applied. But so soon as the child is born, the exertion of crying brings down a portion of bowel or omentum along the open process of peritoneum, which exists in consequence of that which constitutes the tunica vaginalis testis having not been occluded. There is no sac, unless the tunica vaginalis be considered as such; the bowel or omentum lies within the cavity of that tunic, in contact with the testicle—sometimes adherent to it, in which case the tumor is irreducible. Occasionally a portion of bowel contracts adhesions to the testicle while within the abdomen, and, descending with it at the usual time, constitutes this form of hernia before birth.

Strangulation may occur at any time; it has happened to an infant of but a few days old, and required operation. This is performed as in the ordinary tumor. In the reducible cases, a carefully adjusted truss is worn constantly; preventing protrusion; tending to obliterate the peritoneal opening; and so, speedily and surely, effecting a radical cure.

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[1] Luke, Medical Gazette, March 15, 1850.

Fig. 193.

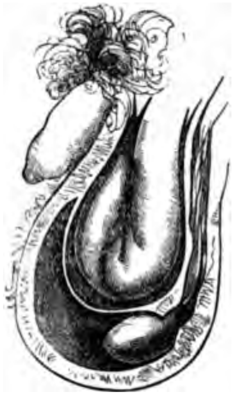


Diagram illustrating the state of parts in hernia infantilis.—Liston.

3. *Hernia Infantilis.*—This term is applied to a more complicated state of parts, originating also in early life. The communication between the cavity of the tunica vaginalis and that of the abdomen is shut at its upper part; but the former cavity is usually spacious, and ascends high in the cord, containing more or less serous fluid. Behind this a hernia descends, invested by the ordinary peritoneal sac. In cutting down on such a tumor, we divide first, the anterior portion of the tunica vaginalis, then the posterior; and, after this, appear the sac and its contents—unless the former, as is not unlikely, be incorporated with the posterior layer of the tunica vaginalis. This form is of rare occurrence.

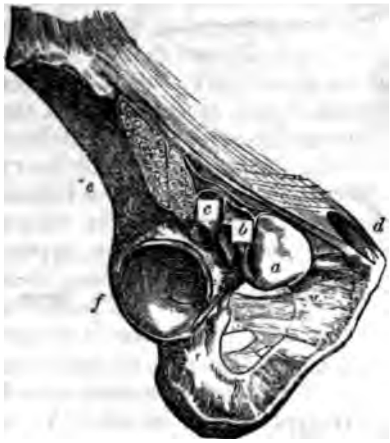
Ventro-inguinal Hernia.

This is also called the *Direct* inguinal hernia. Descent is unconnected with the superior abdominal aperture; and takes place through the abdominal parietes, immediately opposite the lower aperture—the common tendon of the internal oblique and transversalis muscles giving way at that point. Sometimes, however, that tendon is pushed before the tumor, and forms one of its investing fasciæ—protrusion in that case not being through the lower abdominal aperture, but near it. The ordinary coverings are similar to those of the oblique variety; only, this descent being not directly connected with the cord—which is on its outer aspect—there is no cremasteric expansion. The course of the epigastric artery is external to the neck of the tumor (Fig. 122). And hence the general rule, in all cases of inguinal hernia, when strangulated, is to make the deep relieving incision directly upwards, parallel to the linea alba; whether the descent be direct or oblique, the artery is safe. In the direct form, the pressure of the taxis is made directly upwards.

Femoral Hernia.

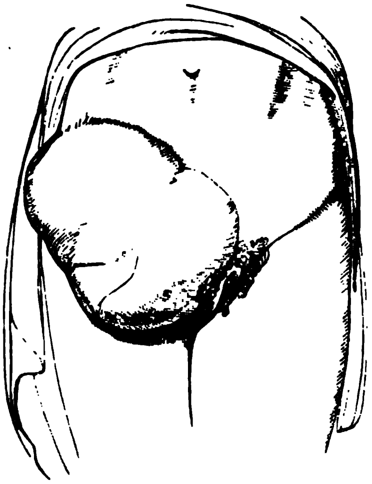
This is most frequent in females; the greater space, in the normal state of the parts, obviously favoring protrusion. Descent takes place through the crural aperture, on the inside of the femoral vessels, and through the saphenic opening of the fascia lata. In the crural aperture the neck of the tumor is contained; the fundus, resisted in its descent on the thigh, makes a sharp turn upwards, and lies on the lower part of the abdominal parietes; the neck is beneath Poupart's ligament, the fundus may be above it. And this must be attended to in applying the taxis; the tumor being invariably unbent, as it were, and made straight, ere the reductive pressure is applied. The tumor is usually of small size; often not bigger than a pigeon's egg; sometimes it is of even huge dimensions; but its average bulk is much below that of the inguinal varieties. The coverings are, integument; the superficial fascia of the thigh; the fascia propria, obtained from the femoral sheath, and continuous with the fascia transversalis and fascia iliaca; lastly, a covering obtained from the textures which normally occupied and occluded the crural aperture. Very often the two last-named coverings are matted together, into one dense fascia; and thus we may expect occasionally to meet with but two investing layers; one the superficial fascia; another beneath it, deep, dense, and strong. Not unfrequently the deep layer splits at its lower part; and the fundus of the tumor, emerging through the aperture, may be covered only by the superficial fascia and integument.

Fig. 194.



Plan of femoral hernia. *a*, The sac; *b*, the femoral vein: *c*, the artery; *d*, the abdominal ring; *e*, section of the psoas and iliacus muscles; *f*, the acetabulum. —From Druitt.

Fig. 195.

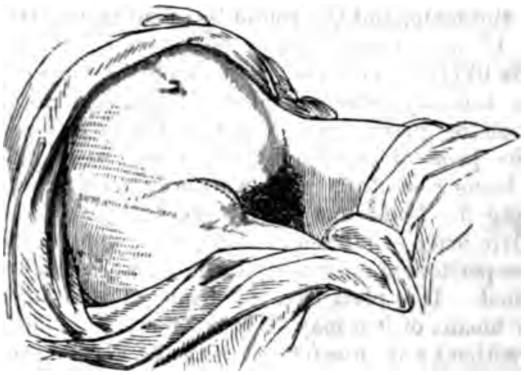


Femoral hernia; of unusually large size.

There are two peculiarities in applying the taxis to this tumor. The position of the patient is as for the inguinal; but with the limb on the affected side bent much upwards, and at the same time carried across its fellow, so as to relax the crural arch, on which, and not on Poupart's ligament, constriction depends. The pelvis, too, may be alternately raised and depressed. Also, as already stated, the neck of the tumor must be unbent and straight, before reductive pressure is made on the fundus; in other words, the tumor is first pushed down on the thigh, and then upwards into the abdomen. After reduction, a well-made truss is applied; the pad resting on the outside of and beneath the spine of the os pubis.

Strangulation is both more common and more severe than in the in-

Fig. 196.



[Ordinary site and appearance of Femoral Hernia, with the direction for an oblique incision. (From Fergusson.)]

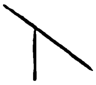
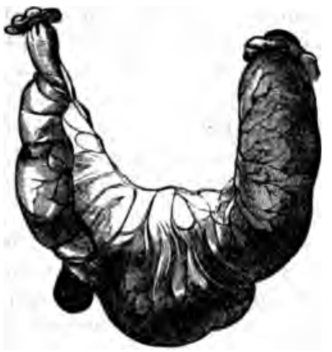


Fig. 197.



Portion of bowel, not including its whole calibre, which was caught and strangled at the crural aperture; the symptoms, though modified, proving fatal. During life, no tumor could be discovered at the site of protrusion.—Liston. His Elements, p. 535.

guinal forms of hernia; and consequently operation is more frequently required. It is performed thus: The skin, having been pinched up, is divided by transfixion; in order that there may be no risk of injury to the important parts beneath. The form of this integumental wound may be greatly varied; an inverted T; an inverted Y; a V; a simple oblique cut; or—The investing textures are cautiously divided, by the forceps and knife—the latter held horizontally; and the sac is exposed. In many cases the opening of it cannot be avoided. And, this having been done, the forefinger of the left hand is passed up to the neck of the tumor. Here, as in the oblique inguinal hernia, there may be two strictures, a superficial and a deep. The former is considerably anterior to the ligament of Gimbernat, and independent of it; formed by the inner and anterior part of the crescentic portion of the crural arch; felt tight, on the inside of the tumor's neck, while the finger's point is yet at some distance from the actual brim of the pelvis. This resistance is divided by a probe-pointed bistoury—slid flatly along the finger, and afterwards having its edge directed upwards and inwards. Dilatation is then made by the finger; and, on withdrawing this, reduction may be effected, readily. If not, then the finger is re-introduced; and, pushing it upwards, Gimbernat's ligament is felt tight and resisting, on a higher level than the former site of constriction. It is divided in a similar way, the bistoury's point being barely insinuated within the pelvis; the least movement of de suffices; a notch in the edge of the ligament is enough; the , following, dilates. Were the deep incision to be made directly 'ds, Poupart's ligament would be divided—an unnecessary act, that 'e being unconnected with the constriction; and, besides, the spercord in the male, and the round ligament in the female, would be gered. If the obturator artery arise by a common trunk with the strio, it is likely to encircle the neck of the sac within the pelvis. were the bistoury, which divides the higher stricture, to be used r—without the guard of the finger, and with any part of its blade ; over the brim of the pelvis—this vessel would doubtless run no risk of being wounded. But, with ordinary precaution—the fore- preceding the knife, and merely the bulbous point of the latter ı the pelvic brim—the vessel is safe, whatever be its distribution.[1] the extra-peritoneal operation, a smaller wound suffices than in the ary method. It is placed on the inside of the tumor, at its upper and by means of it it may be in our power satisfactorily to relieve ricture without any interference with the hernial sac. Should this nd there be reason to suspect that the stricture is in the sac itself, ecessary to enlarge the wound, disclosing the parts more thoroughly; hen we may attempt relief by scratching through the faulty exterores, as in inguinal hernia. Failing this, the sac is opened, and peration completed in the usual way. The after-treatment is as ie inguinal operation.

s in femoral hernia that we are most liable to be puzzled, as to the nature of the tumor. But the safe general rule, as formerly stated, hen in doubt, operate.

Umbilical Hernia.

is is common in infants; and in women who have borne many chil- it is not unfrequent. In the former it very readily occurs; the on of crying forcing the bowel or omentum outwards, through the aconsolidated umbilicus; forming a soft, impulsive tumor; at first all size, not larger than a button—commonly called "a starting of avel." In women, unless congenital, it is seldom a true umbilical ı; protrusion having taken place near, not through, the navel—in quence of a yielding of the abdominal parietes there, probably g parturition. Strangulation is comparatively unfrequent. In the the tumor may attain to an enormous size.

the child, treatment is both simple and effective. The exciting —especially crying—are averted, as much as possible. And comon is made by means of a conical pad—such as a piece of cork, ed with wadding or soft leather—which is made to occupy the usually filled by the protrusion, and is retained in its place by of adhesive plaster; the integument is closed over it in a fold; he whole may be secured by a large circular piece of soap-plaster, l on leather. This simple contrivance is more effectual than any truss or belt, being much less likely to slip; and it has the equally important advantage of not acting as an excitant of protrusion elsewhere. Or the pad may be secured in its place by means of a belt of elastic material. In the course of a year or two—it may be of months only—the parts are found consolidated, and further use of the compress is unnecessary.

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[1] greater safety it has been proposed to use a knife wholly blunt in the edge. This : upon the tight resisting fibres may dilate or tear them, while the elastic artery ı all injury.

In the adult, the case is not so easily managed. The tumor is larger and less repressible. A corresponding compress is necessary, secured either by a belt or by the spring of a truss. Its use is merely palliative. When strangulation occurs, relief is obtained in the ordinary way; by taxis, or by operation. The external wound need not be of large dimensions; most frequently, the hernial contents are found to have no coverings but the integument and the sac; the deep incision for relief of constriction, made by a probe-pointed bistoury on the fore-finger, is placed on the mesial line, usually on the lower aspect of the swelling. The taxis is made directly backwards.

The other varieties of Hernia.

Ventral hernia is a protrusion at any part of the front and sides of the abdominal parietes, except the naval and groins; the result of a giving way at some unusual point, in consequence of bruise, wound, abscess, or muscular rupture. There are no peculiarities in the tumor or its treatment; excepting that, as in most cases of the last-mentioned variety of hernia, but few fasciæ need be expected to invest the sac. A *Perineal hernia* is said to exist, when bowel or omentum, with its sac, descends between the bladder and rectum, and presents itself as a swelling in the perineum. The term *Vaginal* is applied, when, in the female, the tumor does not reach the perineum, but bulges into the vagina. Descent has also taken place through rupture at the fundus of the uterus.[1] The *Diaphragmatic* or *Phrenic*, and the *Ischiatic* forms of hernia—protrusions through the diaphragm and the ischiatic notch—are fortunately rare. They do not admit of accurate diagnosis in life; and are not amenable to surgical treatment, if strangulated—unless the history of the case happen to be so unusually plain, as to warrant incision.[2] The *Obturatorial Hernia*—projecting through the foramen ovale—may be both discovered and relieved. In one case a painful elastic tumor over the foramen ovale was reduced by the simple taxis, with complete relief to all the symptoms of strangulated hernia.[3]

Fig. [illegible]

Diverticulum of the intestine. Its protrusion constitutes the Hernia Litrica.

The *Hernia Litrica*, as noticed by M. Littré, is said to exist when the protruded viscus is a diverticulum of bowel, not a portion of the normal calibre of an intestine. The

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[1] Lancet, No. 1278, p. 184.

[2] Guthrie, Lancet, No. 1483, p. 114.

[3] Monthly Journal, March, 1847, p. 695.

rticulum may be congenital; a mere prolongation of bowel, consist-
of all the normal coats. Or it may be of recent occurrence, formed
protrusion of the mucous membrane of the intestine through its
ular coat, and consisting of the mucous and peritoneal coats alone.
oth forms, the *diverticulum acquisitum* as well as the *diverticulum
enitum*, are liable to hernial protrusion; the former found only at
rural aperture, and always of slow formation (Fig. 197). This form
verticulum being made at the expense of the main bowel, the calibre
he latter is narrowed thereby; and the traction caused by hernial
ent also changes the line of direction in the bowel, forming a sharp
e at the origin of the diverticulum. Above the narrowed and some-
obstructed part, dilatation takes place; and a train of unpleasant
ptoms result, independently of strangulation—costiveness, colicky
s, dyspepsia, flatulency, &c. The congenital form of diverticulum, on
other hand, may protrude without causing any such inconvenience.
ngulation occurring in either case is marked by the ordinary symp-
, follows the ordinary course, and requires the ordinary treatment.
probably, the symptoms will partake more sparingly of the signs of
ruction, than in ordinary cases, at least in the first instance.[1]

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[1] See on this subject Brit. and Foreign Med. Rev. Oct. 1842, p. 360.

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CHAPTER XXIX.

AFFECTIONS OF THE RECTUM.

Abscess Exterior to the Rectum.

Abscess in the areolar tissue exterior to the rectum is almost always of an acute character, and most frequently affects adolescents, or young adults of a weakly system. There are two distinct varieties, according to the site. One is quite external in the nates, early pointing outwards, attended with no great constitutional disturbance, not tending to burrow backwards on the bowel, and generally getting well under the simplest treatment. The other originates in a comparatively deep locality by the side of the bowel, perhaps nearly two inches from the orifice. Pain, in the latter case, is great, and the constitutional disturbance severe; evacuation of the bowels is seriously impeded, and when attempted, suffering is greatly increased: at first no fluctuation is to be perceived, but hardness is felt on firm pressure with the finger by the side of the anus, and also when the finger is passed within the bowel; throbbing pain continues, the hardness enlarges, and ultimately a softening may be detected in its centre: matter forms rapidly and in quantity; it may gradually and painfully reach the surface; or, slow in its outward direction, the gut may give way by ulceration, and by this internal aperture the pus may be imperfectly discharged.

In treatment, our main object is to procure early and outward escape; attempts to prevent suppuration having previously failed. In the deep variety, the plunge of a bistoury, by the side of the bowel, so soon as softening has begun, is essential to prevent great constitutional disturbance and risk of the establishment of anal fistula. After evacuation, great attention to the general health will be required; inasmuch as without considerable improvement in the tone of system, it will be found difficult to heal the wound, and equally difficult to prevent recurrence of the abscess. Not unfrequently a cachexy is met with, which baffles all remedial efforts—connected with phthisis of the lungs. In short, abscess exterior to the rectum is to be looked upon with suspicion, as regards both part and system—and treated accordingly.

Rectitis.

The inflammatory process affects the rectum not unfrequently; of idiopathic origin; or caused by external injury, lodgment of foreign matter, or exposure to cold; or connected with an excited state of hemorrhoids; or an extension of inflammation from a contiguous part.

In acute cases, the symptoms are very severe. The part is somewhat swollen, and most exquisitely painful; the sphincter acts spasmodically, and each movement of it aggravates pain to torture; intense burning heat is complained of; a scalding discharge passes away; or, in intense cases, the heat is at first dry as well as burning; the constitution suffers severely by fever. The urinary organs sympathize; there is painful micturition, and not unfrequently strangury or even actual retention occurs. The progress and results vary. Resolution may take place, with copious mucous discharge—perhaps with hemorrhage. Or the discharge is purulent, coming from the mucous coat; and resolution is both slow and incomplete. Or ulceration may take place; superficial and broad, limited to the mucous lining; or circumscribed and perforating, causing an aperture into the areolar tissue without, where fresh abscess forms, and fistula results. Or, the affection proving of a minor but persistent nature, plastic exudation takes place in all the coats, but more especially beneath the mucous; and simple organic stricture is established.

Such being the risks of an advanced or obstinate inflammatory process in the rectum, treatment comes to be regarded as important; early and effectual, to anticipate evil. In the first instance, the cause is to be ascertained—and, if possible, removed; foreign bodies, for example, will be taken away, and ascarides expelled. The recumbent posture is enjoined, and blood taken away by leeching. No purgatives are given—but gentle enemata, if necessary. To allay spasm, and to soothe the sympathetic irritation under which the urinary organs generally suffer, opium is useful; in ordinary doses by the mouth; and largely applied to the part in the form of inunction, enema, or suppository. Fomentation can scarcely be applied too hot or too sedulously.

Fistula in Ano.

By this is understood a fistula, or sinus (*Principles*, 4th Am. Ed. p. 199), by the side of the rectum; sometimes opening externally in the nates, but not communicating with the bowel, and then termed Blind External fistula; more frequently communicating with the bowel, but not yet opening externally, then termed Blind Internal fistula; usually having an aperture of discharge both externally and into the bowel, and then said to be Complete fistula. In the complete form—by far the most frequent—there is discharge of purulent matter by the fistulous tract; flatus also escapes, and feculent matter. There is heat and much discomfort, often pain, increased by spasms of the sphincter; not unfrequently aggravations take place by recurrence of inflammation; and usually the general health is more or less undermined. Healing is prevented by at least three circumstances; the fistulous condition of the cavity and aperture—obviously unfavorable to contraction and consolidation; the frequent, almost constant, passage of foreign matters along the track; and frequent motion caused by the action of the levator and sphincter ani. The sinus may be monolocular or multilocular; that is, consisting of one simple track, or having more than one collateral sinus connected with the main and original one—the minor probably the result of intercurrent inflammatory attacks. The cavity may be wide within; more frequently it is narrow—of the nature of true fistula; it may extend high above the sphincter, more frequently its end is within two inches of it. The internal opening—to be found in the great majority of cases—is invariably within easy reach of the finger; usually about an inch and a half from the orifice; of various dimensions, sometimes so small as not to admit the end of a common probe, but seldom if ever so large as to allow the passing of a finger's point; its size, circular form, and general character, denoting its origin to have been by perforating ulceration of the bowel.

Such perforating ulceration is the proximate cause of complete fistula; and it may come from without or from within. According to some authorities the origin is always from within; rectitis produces perforation; through the aperture, feculent matter escapes into the areolar tissue without; abscess forms there, which, only partially discharged by the internal and original opening, ultimately gains the surface, on the nates, and is thence mainly evacuated. That such is the state of matters in many cases there seems no reason to doubt. But it cannot be denied that not a few may and do follow a different course. Abscess begins in the external areolar tissue, idiopathic, or caused by injury, or following exposure to cold; it slowly advances outwards, at the same time burrowing by the side of the bowel. The matter may escape externally, while the bowel's coats are yet intact; constituting blind external fistula. Much more frequently, there is the internal opening too; of secondary formation, however, not primary—caused by pressure from without, and beginning in the peritoneal coat. And that this tunic is capable of taking the initiative in perforating ulcer, although less easily and more rarely than the mucous—even without so powerful an exciting cause as the pressure of an abscess—cases are not wanting to prove.[1]

Very frequently, fistula in ano is coexistent with pulmonary phthisis; probably caused by it, and constituting but one of the symptoms and signs of that intractable malady. The frequent cough of the invalid, causing straining on the bowel, and the tendency to mucous ulceration in the great gut—so favorable to production of the initiatory perforation—readily explain how the anal and pulmonary affections should not unfrequently be in close connection.

The history of fistula is not complete till careful examination has been made, by means of the probe and finger. The latter having been introduced into the bowel, the probe—with a broad and bulky termination to its handle, which renders it more obedient to the hand, and enables it to indicate with certainty the direction of the point when curved—is passed gently into the track, or tracks, so as to ascertain their number, position, and extent; but more especially to ascertain the exact position of the internal aperture—that is, on what aspect of the bowel it has formed, for, as already stated, it is as to height almost always close to the sphincter. In order to facilitate the entrance and movements of the probe, it is sometimes necessary to dilate the external opening in the first instance. When there is no outward opening, the case being an example of the blind internal variety, there are usually plain enough indications of the site of the abscess—hardness, discoloration, pointing, &c.; and a plunge of a lancet or bistoury will at once change the case into the complete form. Or a probe, bent very much, may be introduced from the rectum into the internal opening; and by pushing the handle on the opposite nates, its point may be made to project on the affected side, and being felt there may be cut upon.

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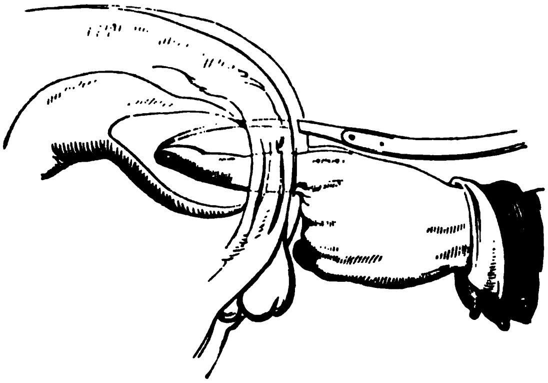
[1] London and Edinburgh Monthly Journal, January, 1844, p. 40.

The treatment of fistula is simple—and, if the disease be merely local, usually quite effectual. The main obstacles to healing are the fistulous condition of the track, and the frequent motion by muscular action. By laying open the track, and at the same time dividing the sphincter, both are overcome. The patient is made to stoop over a bed or table, with the limbs unbent and somewhat apart; if anæsthesia be employed, he is recumbent with the legs raised. An assistant separates the nates to the full. The surgeon, seated, inserts the probe, taking especial care to lodge its extremity in the bowel through the ulcerated internal opening. The probe may be grooved, so as to admit of a curved, strong, probe-pointed bistoury being passed along it; or, the probe having been withdrawn, its place is occupied by the bistoury—used at first merely as a probe. The point is then met in the bowel by the fore-finger of the other hand —right or left, according to circumstances, for here ambidexterity is essential—and with the point pressing firmly on the finger, and with the edge moved in a gently sawing motion, both hands are brought down towards the operator, causing division of all that is within the concavity of the instrument. When this is of considerable thickness, or of almost cartilaginous density—as not unfrequently is the case—a particularly stout and well-tempered blade must be selected for the service, lest it give way. It is unnecessary, however, to divide any great extent of parts, for the following reasons: There is almost always an internal opening; this is invariably situate almost immediately within the sphincter; it is essential to make the line of division pass through this aperture; but that having been done, there is in no case any necessity for passing the knife higher, however extensive the fistula may be. It is by no means uncommon to find the track passing higher than the

Fig. 199.



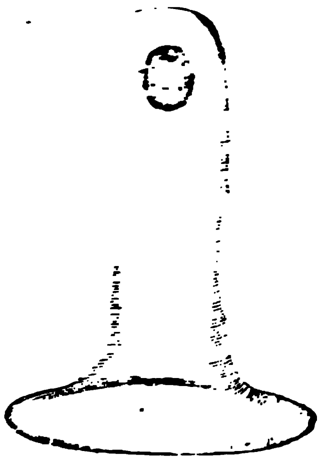
Plan of the operation of Fistula in ano, the finger and bistoury met in the rectum previously to division.

[illegible] [illegible]; [illegible] in these cases the ordinary operation is all that is necessary—the knife entering at the internal opening, and no higher. The only advantage of this is the avoidance of danger from loss of blood. In high fistulæ [illegible] arterial branches of considerable importance. In the shortened incision, only small branches will spring; they are seen at the time of division, and can readily be secured by ligature, if need be—[illegible] very seldom is the case. Should any hemorrhage come on—[illegible] between the dressings—it should be met [illegible].

In the [illegible] form, in progress of formation, by abscess originating in the areolar tissue, I have been tempted to evacuate the abscess, and then at once to complete the operation for fistula; hoping thus to save time and pain. It is better to evacuate and delay; permitting the abscess to contract and to degenerate into the condition of fistula; then operating for the cure of fistula. The wound is less painful and less extensive; and the result is at least equally satisfactory. Similar caution is applicable in cases of [illegible] in which abscess has repeatedly formed around the anus with burrowing. It is well to evacuate and drain by opening and counter-opening, waiting till the suppurated space has contracted, and when much less extensive incision will consequently be required.

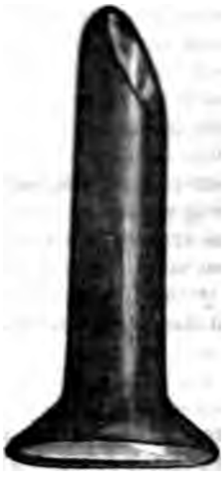
In the blind external form—that is, when we have searched carefully for the internal opening and found none—which will seldom be the case—the bistoury, having been passed to the usual site of opening, has

Fig. [illegible]



[Anal speculum, made of thick glass, silvered and blackened on the outside; closed at the upper end, with an aperture just below for the examination of the gut, and for local applications.

Fig. [illegible]



Another instrument, made of similar material; a part of the closed extremity cut off obliquely, to allow of inspection and topical applications being made. (From Fergusson.)]

the edge of its point inclined towards the finger introduced within the bowel; by a gentle rubbing motion perforation is effected; and then the operation is completed in the usual way.

The use of the anal speculum [Figs. 200, 201] may assist in detecting the internal opening. And when this is found, the speculum may be retained as an auxiliary in the operation; the parts yielding much more readily to the knife when put upon the stretch, as they are by lodgment of the open instrument.

Immediately after withdrawing the knife, bleeding is attended to. If an artery spring, it is tied; if there is oozing, at all formidable, pressure is applied by stuffing the wound moderately with lint. Usually, there is no necessity for any hemostatic; and it is enough to interpose a small portion of lint, or other dressing, between the lips of the wound, so as to prevent premature closure of the superficial part; our object plainly being, that the whole track shall inflame, granulate, and heal from the bottom. No cramming is necessary; slight dressing is sufficient.

Before operation, the bowels have been well cleared out by a purgative, aided by an enema if necessary. After the operation a full opiate is given; to lull the pain, and at the same time to prevent movement of the bowels—this not being contemplated for a day or two. At the end of the third or fourth day, a dose of castor oil, or other simple and bland aperient, is given; and this, operating, brings away the contents of the rectum, including the dressing of the wound. Afterwards, it is enough to regulate the bowels; to make sure, by examination from time to time, that the wound is not closing prematurely, and that superficial sinuses are not forming, to attend to cleanliness; to apply water-dressing, by means of lint and oiled silk—retaining the dressing by a T bandage; afterwards medicating this dressing by ordinary stimulants, as the state of the granulating surface may require. For obvious reasons, a close regard is paid to the system, throughout.

If fistula in ano coexist with evident and advanced pulmonary phthisis, a question arises as to the propriety of operation. It may safely be answered in the negative. For, first, the operation will fail in its local effect; the wound, in all probability, will not heal. And secondly, supposing that it did heal, the result would probably be most injurious on the system; the pulmonary disease advancing with fresh virulence, on the closing up of an outlet whence purulent and other products had long been habitually discharged; in like manner as the temporarily and locally successful amputation of a strumous joint, may have the effect of greatly shortening the phthisical patient's term of existence (*Principles*, 4th Am. Ed. p. 464).

Fissure and Ulcer of the Anus.

Fissures of the anus are extremely troublesome. They are most common in the adult; but no age is exempt: they have been observed in children at the breast. A chap or crack, analogous to what is observed on the lip, forms on the verge of the anus, in the mucous coat of the bowel; and is the seat of much pain, often of intense agony, more especially when the bowels are moved; then, too, spasm of the sphincter adds greatly to discomfort. Sometimes, indeed, the muscle is found to be in a state of almost perpetual spasm; simulating most of the signs of stricture of the bowel; and the existence of the fissure may be obscured, in consequence of the obstacle which such spasm affords to ocular examination. In looking for fissure, the nates are forcibly separated by an assistant, and downward traction is made upon the anus with the fingers of the surgeon, the patient meanwhile straining as if at stool. Sometimes the assistance of a speculum may even be required.

Almost invariably, this affection is found connected with previous disorder of the primæ viæ—perhaps a long-continued dyspepsia. And, in treatment, this circumstance has an important bearing. For, no local management can be expected to prove fully successful, unless the cause be taken away; that is, in most cases, the noxious matter lodging in the bowels must be removed, and the functions of the mucous lining must also be amended. In such cases, a cautious dose of calomel will probably be found the most suitable prescription at first; followed up, according to circumstances, by gentle aperients and alteratives. The part may be touched freely with nitrate of silver, or with the fluid nitrate of mercury; and relief of pain may be obtained by belladonna ointment, or by chloroform made into the form of ointment, or by hot poultices medicated strongly with opium in solution. Very frequently, however, such local treatment is resisted; and then a simple and slight operation is required. By means of the forefinger and a probe-pointed bistoury an incision is made through the mucous coat, including the fissure. And thus the irritable sore is at once converted into a simple wound, which first inflames, and then heals in the usual manner. But should this fail—as will not often be the case—the knife has again to be used; pressing it more deeply, the sphincter ani is divided; and the part, thus set at rest, quickly heals. Or by a subcutaneous puncture from without, the muscle may be divided, without interfering with the mucous membrane. To recapitulate: in all cases, great and primary care of the stomach and bowels is necessary; with this, some fissures heal under ordinary local treatment suitable to irritable sores; others require simple incision; and others, more obstinate, demand in addition division of the sphincter.

Ulcers of the mucous membrane of the anus are liable to assume the irritable character, and then are productive of the same distressful symptoms as fissure. They require, and are subject to, similar treatment. Situated more internally, they are not ordinarily visible, even on the most careful examination. The finger cautiously introduced, may detect them, by the peculiar feel which the ulcerated part conveys to the examiner, and by the great increase to the patient's suffering which is invariably produced by the finger's resting upon that part of the bowel. By means of the speculum their exact circumstances may be accurately surveyed. In those cases which evince no great irritability, tannin is often a most serviceable local application, in the form of ointment or suppository.

Immediately in front of the coccyx—that is, at the back part of the anus—a broad and deep ulcer, capable of receiving the finger's point, is not unfrequently observed. For this, exposure by the speculum and the application of nitric acid, or nitrate of mercury, are usually necessary.

Hemorrhoids.

orrhoids, or *Piles*, are divided into two kinds: external and in-
They seldom occur before puberty, and are perhaps more com-
females than in males; certainly more troublesome to the higher
the lower ranks of life. The predisposing causes are whatever
o determine blood to the rectum, and to retard the return of
from it; habitual constipation, pregnancy, abdominal tumors of
nd, torpor of the liver, sedentary avocations with luxurious living.
e exciting causes are whatever acts on the bowel itself excitingly,
ging, bilious diarrhœa, exposure to cold and wet, &c.

rnal piles are of but one structure; a congeries of varicose veins,
nded by hypertrophied areolar tissue, and covered partly by mu-
embrane, partly by loose rugous integument. They may be un-
ng the inflammatory process, or they may be indolent and quiet.
or more points, ulceration may have exposed their interior, and
leed; or they may be *blind*, as the phrase is—emitting no blood.
ricose veins may have their normal fluid contents; or these, co-
d, may have caused condensation of the tumor, more or less com-
The tumor may be single; usually more than one exists.

tment is either palliative or radical. The latter consists in re-
the morbid formation, by scissors or bistoury; leaving the sore
remains to heal in the ordinary way. Palliation varies according
umstances. If the part be inflaming, rest and the ordinary an-
gistics are necessary. If it be in the indolent slate, stimulants and
ents—iodine, galls, tannin, hellebore—are applied, with the view
kering up the loose integument, obtaining discussion of the solid
al textures, and restoring the normal condition of the veins. The
are carefully regulated; and, for this purpose, sulphur is the
e medicine—usually combined, in the form of electuary, with
confection; and sometimes, too, a proportion of copaiba is a good
n; dosed so as to avoid overaction, while it insures a daily and
nt passage of a semifluid stool. By some, linseed oil taken inter-
s preferred as a soothing and safe laxative.[1] If any dyspeptic, or
lisorder of the primæ viæ exist, that must be removed as speedily
oroughly as possible. Very often the liver is to blame, and re-
special treatment.

unfrequently, a small, recent, tense pile presents itself, acutely
ed, and exquisitely painful. A simple proceeding not only affords
t relief, but also may effect radical cure. With a lancet or bis-
it is to be laid freely open, throughout its entire extent; the
ated blood rolls out, a salutary loss of fluid blood takes place, and
equent healing of the wound consolidation is effected.

rnal piles are of different kinds. 1. They may be of similar
re with the external; varicose veins, surrounded by hypertro-
reolar tissue, and covered by mucous membrane more or less altered;
r blind; inflaming, or indolent. 2. They may be genuine tumors,
nature of simple sarcoma; more or less pendulous in their form.
y more frequently are of the nature of erectile tissue; this abnor-

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[1] Brit. and For. Rev., Oct. 1850, p. 553.

mal development having taken place in the submucous areolar tissue, as well as in the membrane itself. The tumor usually presents a broad base of attachment; and sometimes the surface resembles that of the strawberry.

Internal piles are most commonly of the last variety. If large and numerous, they may constantly protrude more or less from the anus; general relaxation of the mucous membrane of the rectum admitting of this. More frequently, they do not show themselves externally, except when the bowels are moved; and then the straining causes them to descend. If not replaced, they may become constricted by the sphincter, and inflame. At each stool, it is common for blood to be lost; small arterial jets taking place from one or more points of the tumor—more especially if constricted. Usually, the patient gets into the habit of replacing the prolapsed tumors, after each evacuation; and, during the intervals, he may sustain no great inconvenience in the part. If the loss of blood, however, be habitual—even though but a small quantity escape at each time—the system is certain to give way under it; the patient becoming thin, weak, pale or sallow, dyspeptic, annoyed with tinnitus aurium, giddiness, and palpitations (*Principles*, 4th Am. Ed. p. 327). If the tumors are bulky, and often protruded, they are always in a more or less excited state; there are pain, swelling, heat, and discomfort, discharge of mucous and puriform fluid; and these, superadded to the effects of loss of blood, speedily undermine the frame. In extreme cases, the whole bowel is relaxed; and prolapsus ani accompanies and untowardly complicates the hemorrhoidal state. At any time, the inflammatory process may extend from the abnormal structure, and seize the bowel—producing rectitis, probably of an aggravated form. Thence abscess and fistula may result; or, under a minor degree of disease, simple organic stricture may form. The urinary organs sympathise greatly, during rectal excitement connected with piles—whether these be external or internal.

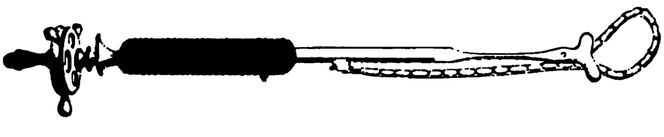
To allow such an affection to follow its own course, is thus seen to be dangerous to both part and system. Treatment is general and local, palliative and radical. The general treatment is to be pursued in all cases; regulating the bowels, looking to the liver, attending to regimen. Hemorrhage may be restrained by the internal exhibition of gallic acid, oil of turpentine, or other suitable astringent. If palliation only be intended, the local treatment will consist of careful reduction, after each evacuation of the bowel, and the occasional injection of some astringent fluid: such as solutions of rhatany, zinc, sulphate of iron, matico, oakbark, or tannin; or the last-named remedy may be very conveniently and efficiently applied in the form of suppository. If excitement occur, then come antiphlogistics, anodynes, and attention to the bladder. The radical treatment consists of removal by ligature. In the case of the solid genuine tumor, the knife may be used with impunity. But such formations constitute a small minority of internal piles. The overwhelming majority are vascular; and the greater number of these consist of erectile tissue. To cut them out, were on each occasion to endanger life by hemorrhage; not only because the parts are vascular in themselves; but also because the interior of the rectum is favorable for con-

l oozing of blood, and ill adapted for the application of pressure or
direct hemostatics. Consequently, deligation is preferred.

e operation by ligature is thus accomplished. The patient having
he bowels freely opened, is placed as for the treatment of fistula.
evious straining at stool—renewed at the time of operation, if
sary—the tumors are made to protrude to the full; an assistant
ating the nates. If the form be at all pendulous, it is well to seize
ndus by means of a large volsella, and over this to apply a strong
re, drawn very tightly around the neck of attachment. But if the
be broad, and the form of the swelling irregular, it is necessary to
ix the base by means of a stout needle; and by tying separately
lves of the ligature, so to effect strangulation. Before tightening
cond half of the knot, it is advisable to incise the livid fundus,
tting its fluid contents to escape; for then the noose can be tight-
more thoroughly and the tighter the constriction, the more rapid
ess painful is the cure. Deligation having been completed, the
of the ligature are cut off close to each noose; and, by gentle
ulation, the strangled parts are replaced within the sphincter. If
ternal hemorrhoid, or loose fold of skin be found, it is removed by
veep of a knife or scissors; and if an arterial twig of any impor-
spring, it is at once secured by ligature.[1] A full dose of morphia
en, to lull pain and prevent motion of the bowels. The bladder is
ed; and if strangury or threatened retention occur, warm fomen-
is to be sedulously applied to the hypogastrium, along with the
al administration of henbane and sweet spirits of nitre, in small
epeated doses. By medicated poulticing, the pain in the anus
e somewhat assuaged. In a day or two, the sphacelated parts
ate; and the remaining sore is treated as its circumstances may
nd. Fetor is subdued by the chlorides. After cicatrization,
y use of the tannin suppository is sometimes advisable, to promote
sure complete restoration of the normal calibre and tone of the
.

e *écraseur linéaire* of Chassaignac, of which an improved form by
iere is represented in Fig. 202, is likely to take the place of the liga-

Fig. 202.



n this as well as in many other operations in which the expedient
angulation is resorted to for the purpose of removing diseased parts.

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[1] is removal of loose skin is of great consequence, and should never be omitted; other-
e anus remains lax, and predisposes to further hemorrhoidal formation. Usually
a packet of rugous skin connected with each internal hemorrhoid; and the one is
useful index of the other. Some surgeons think it sufficient to take away this outer
believing that the tight cicatrix will prevent reprotrusion, and that then the hemor-
ly degenerated part will recover itself. But according to my experience, removal of
les and skin is essential to a complete and permanent cure.

[For a full description of this instrument and its uses, the reader must be referred to the article in the Am. Jour. Med. Sci. (Jan. 1857, p. 52), from which the illustration has been taken. It may be briefly described as a chain-saw, so arranged in a handle as to form a loop with its middle portion, which compresses, strangulates, and finally divides the tissues embraced within its grasp, by means of a crushing and sawing motion, imparted to it through a gradual and alternate traction of its ends. The action of the knife and ligature are thus combined, so as to obviate the danger of hemorrhage from the one, and the inconveniences and aggravated suffering from the other.]

In many cases anæsthesia may be used, without detriment to the facility or efficiency of the operation. And a subsequent minor use of chloroform is often of much service in assuaging the after pain.

In the slighter cases, nitric acid has of late been employed with advantage; when the tumors are small, recent, and composed of altered mucous membrane—investing slightly varicose veins, or perhaps only hypertrophied areolar tissue—the disease being mainly resident in the membrane itself. The parts, having being made to protrude, are rubbed over with strong nitric acid so as to produce an eschar; and are then replaced within the sphincter, as in the case of deligation—carbonate of soda being freely applied so as to prevent unnecessary action of the escharotic. The eschar separates, removing the altered membrane; the sthenic suppurative action which attends on cicatrization, would seem to act restoratively on the textures around; and the tightness of the cicatrix, when completed, may by its support prevent recurrence of varix beneath. By the potassa fusa, too, hemorrhoids may be very efficiently destroyed; the neighboring parts being carefully protected by use of vinegar.

Patients of greatly deranged livers are subject to general fulness in the lining membrane of the rectum, perhaps with one or more internal hemorrhoids, accompanied by a febrile state of system. In such cases, we are not to operate in any way, until the liver has been restored to a healthy or at least quiet state, and the general excitement has been calmed—otherwise the result might be serious, by aggravation of the internal and constitutional disorder.

In elderly, full-living patients, also, affected with disease of the heart, or showing a tendency to affection of the head, bleeding piles, are not to be rashly interfered with; else the sudden cessation of discharge, and subsequent plethora, may entail the most calamitous results. The operation, if had recourse to at all, is not performed till after due preparation of the system. And the after treatment is conducted with much care and caution.

Similar precaution is requisite in the case of females, from whom blood escapes in large quantity and periodically, because vicarious. Such bleeding, however, is not always connected with piles. It may proceed from the lining membrane of the bowel, little if at all changed.

In advanced cases of bleeding piles, it is sometimes difficult to determine whether the *bruit*, palpitation, and other signs of diseased heart are primary or secondary, dependent on an organic cause, or merely on anæmia. Diagnosis, in this respect, requires much caution; and when in

, we may lean to the side of operation, ready with leeches, seton, or compensating treatment, should troublesome consequences threaten.

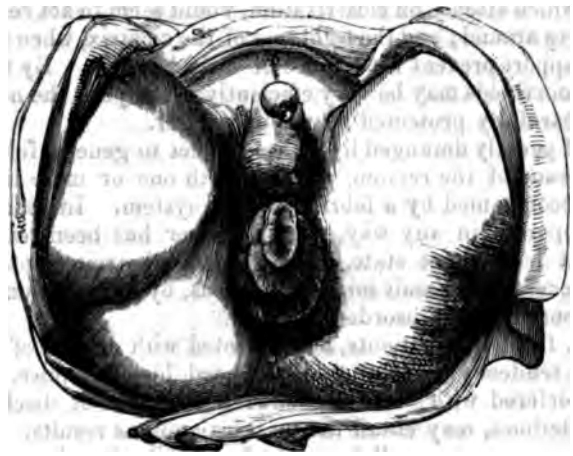
Polypus of the Rectum.

iple polypi are occasionally, yet seldom, found in the rectum; most only in children; and then may be mistaken for prolapsus. In the the fundus may become hard, rough, and ulcerated, and prove trouble- by bleeding. There is frequent desire to go to stool, with discharge, iness, and occasionally pain and swelling. At each evacuation, the h is apt to be protruded, and usually requires replacement. Treat- is removal, by knife or ligature. Obviously, the preferable method deligation; but, after the ligature has been secured on the neck of iment, the main body may be safely cut away, in order to prevent n and expedite the cure.

Prolapsus Ani.

consequence of relaxation, the rectum may become everted, on ing, and protrude beyond the anus; and the protrusion may be constant or occasional. Also, it may be either partial or complete; s, the protrusion may consist of the entire bowel—or, as is by some sed, of rather the sigmoid flexure of the colon; or it may be merely cent of the mucous coat alone—a frequent concomitant, as has ly been observed, of internal hemorrhoids. This partial prolapsus ccur at any age; and is probably most common in the middle-aged; ie complete form is an affection almost peculiar to the two extremes e; old age and childhood. The child is liable to irritation of the , by ascarides, or by a perverted secretion from the general mucous and the habitual straining, which results, tends to the change in

Fig. 203.



Prolapsus Ani.

question. In the old man, too, there is much straining; by reason of enlarged prostate, or debility of the muscular coat of the bladder. In the child there is much crying; in the old man much coughing. Stone and stricture may induce prolapsus at any age.

The tumor varies in size, from a mere annular border to the anus—as in the partial prolapsus—to a swelling as large as a child's head. The membrane, if habitually down and exposed, changes more and more to the cuticular character; much discharge takes place, of a reddish jelly-looking substance; inflammatory aggravations are liable to occur, causing much increase of distress; and, at any time, the existence of descent is accompanied with painful uneasiness in the part, and an oppressive general languor and debility—at least in the adult.

In the child, the affection may generally be removed by riddance of its cause. At the same time, care is taken to replace the protrusion after each descent; the bowels are duly regulated, and evacuation should always be made in the recumbent posture; crying should be avoided as much as possible; astringents may be used both outwardly and within—that is, in the form of lotion, ointment, injection, or suppository; and iron or other tonics are usually indicated, on account of laxity of the general system. If protrusion have been neglected, and have attained a large size, some difficulty may be experienced in effecting replacement. Pressure is applied, as in the taxis for hernia; the parts having been previously lubricated. And it is well to make the reducing pressure chiefly during the straining or crying efforts of the patient, the verge of the anus then presenting a fixed point on which the reduction may be made. If the protruded part be found constricted, inflaming, and swollen, it is better not at once to attempt reduction; but, in the first instance, to diminish the bulk and excitement, by leeching, rest, and ordinary antiphlogistic means.

In the adult, there is the same necessity for removal of the cause, if possible; but cure seldom follows so simply. The same attention to replacement is to be enforced; and a pad may be worn, directly compressing the anus, so as to oppose reprotrusion. This pad—slightly conical in form, so as to fit into the anus—may be applied by means of the common T bandage; or what is better, is adapted to a spring, as in the truss for hernia. Astringents are used, the bowels are regulated; and amendment, if not cure, is hoped for. It may be well, perhaps, to procure the daily stool at night; so that afterwards the long recumbency of bed-time may prove favorable, in obviating the tendency to protrusion which is greatest after functional excitement of the part.

Such is the palliative treatment. For a radical cure, other measures are required. One or more of the redundant folds of the mucous membrane may be removed, by knife or ligature; in the hope that the contraction of healing may sustain the replaced parts in their normal relation. But it is better in most cases, while leaving the bowel intact, to take away the redundant integument externally; hoping that the subsequently puckered cicatrix may effectually support the parts within, and prevent further protrusion. This removal of skin may be by knife or scissors, or by actual cautery. The latter agent is perhaps unnecessarily severe; but, whichever is employed, the immediate pain may be safely abrogated by the use of chloroform. These means failing, another operation has been proposed; an abbreviation of the sphincter. By incision, a portion of this muscle is removed; and then the remainder, having been brought together, and got to adhere, is expected to constitute a more active and effectual guardian of the mucous outlet. The success of this proceeding, however, has yet to be proved. And, in any such operation, especial care must be taken lest the task be overdone; and an unnatural tightness of the orifice result.

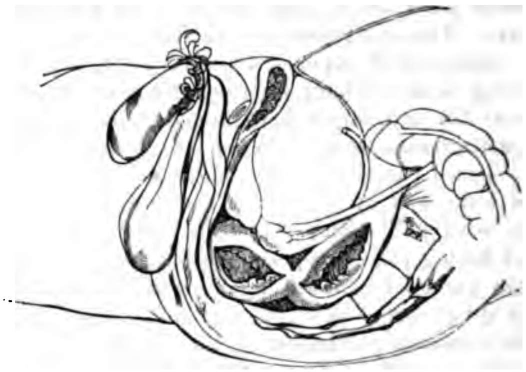
In the adult, accurate diagnosis is always important. Many a patient, during a long course of years, wears a painful truss for what is supposed to be prolapsus, but is in truth mere looseness of the anal verge, with internal hemorrhoids—remediable, as we have seen, by a very simple operation.

Stricture of the Rectum.

Contractions here, as in other mucous canals, are of three kinds: spasmodic; organic and simple; malignant. The *Spasmodic* does not frequently constitute a disease of itself; but is rather an accompaniment of some other affection—as hemorrhoids, fissure, or ulcer of the anus. Its main symptoms are, painful tightness of the part, with difficulty and pain in voiding the fæces. The site of constriction is at the orifice of the bowel; and the immediate cause is spasmodic action of the sphincter muscle. If it be but an attendant of another disease, removal of the latter will ordinarily suffice for cure. In a few cases of its single occurrence, treatment consists in rectifying the primæ viæ, which will invariably be found more or less deranged; and in the occasional use of a short bougie, of metal or caoutchouc, passed just within the sphincter, and retained for a few minutes on each occasion. An obstinate case may render division of the sphincter expedient; and in such circumstances the subcutaneous operation will probably be preferred. Belladonna may be used, in the form of ointment.

Simple organic stricture is the result of a chronic Rectitis, as already stated. The constriction depends partly on condensation and thickening of the entire coats of the bowel; but mainly on deposit in the submucous areolar tissue. The ordinary site is about two inches from the orifice; and it is seldom indeed that this form of stricture is found beyond reach of the finger. The leading symptom is difficulty in defæcation, with slimy discharge; the fæces passing in flattened and attenuated form, like tape, when solid, and when fluid being liable to forcible ejection as if from a syringe. Derangement of the digestive organs, with impairment of the general health, is induced; the abdomen becomes swollen, perhaps tympanitic; and the urinary organs are sympathetically involved. Above the stricture, dilatation takes place, and there ulceration is apt to occur in the mucous membrane; greatly aggravating the distressful symptoms, perhaps inducing fistula—and, in the aged, not unlikely to degenerate into malignancy. From the obstructed state of the bowels, enteritic symptoms are not unlikely to arise; but, independently of sudden or casual aggravations, life is ultimately endangered by advancing emaciation and general disorder. Treatment consists in maintaining a gently open state of the bowels, mitigating the painful symptoms in the part and neighborhood by suitable remedies, and gradually obtaining dilatation of the bowel at the contracted part by a cautious use of bougies; not failing to remember that the cure is not by mechanical dilatation, nor by inflammation, but by gradual absorption of the submucous abnormal deposit. The best form of this instrument is that made of elastic material, pliable, smooth, yet dense enough to resist circular compression. Having been introduced gently, it is retained so long as the feelings of the patient permit; and it is well that the lower part of the instrument should always be narrow, so as not to distend the sphincter and cause irritation. Or the bougie may be so formed as to lodge wholly within the bowel; an attached ligature or tape protruding, whereby it may be extracted. The portion of the instrument which is intended to pass and lodge in the stricture is gradually increased in size, until a full-sized bougie can be used without difficulty. Then dilatation may be deemed complete; yet, to insure against relapse, an instrument should be passed occasionally for some time afterwards.

Fig. 204.



Rectum opened laterally; showing stricture of the bowel at the ordinary site.

Sometimes a tight callous stricture is found to resist the ordinary treatment. Then the knife's edge may be used with advantage; the surgeon slightly notching the contracted ring at many points, by means of a probe-pointed bistoury introduced on the finger; and afterwards proceeding with dilatation, in the ordinary way.

Spasm of the anus may simulate organic stricture; and many of its symptoms also attend on enlargement of the prostate. Consequently, an accurate diagnosis can never be obtained without careful examination. By the frequent and forcible dejection of fluids, diarrhœa may be simulated; and a very erroneous treatment, by astringents, might be enforced, were examination of the part neglected. In most cases, the stricture is within reach of the finger; and in such, there is no difficulty; the finger's exploration removing all doubt. Sometimes, however, the contraction is higher in the bowel. And then great caution is necessary in employing the exploratory bougie; for a fold of mucous membrane, or the natural promontory of the sacrum, in a healthy bowel, may obstruct the point of the instrument for a time, more especially if this be rashly and unskilfully introduced. By disreputable empirics, indeed, such obstruction is made use of as a means of deceiving healthy patients into a belief of the existence of stricture.

Malignant stricture, or *Scirrho-contracted rectum*, is by no means uncommon in the aged—and more especially in the female; supervening, usually, on some pre-existing affection of a simple kind; as piles, or simple stricture. The symptoms are such as attend ordinary contraction, with the addition of copious, bloody, fetid, puriform discharge; greater sympathy of the urinary organs; greater difficulty and pain in defecation; and the ordinary constitutional cachexy which attends and characterizes malignant disease. When the verge of the anus only is affected, the diseased parts may be removed by the knife. But if the disease extend some way up the bowel, as it usually does, we must content ourselves with palliation; assisting defecation by enemata and laxatives; and lulling pain by opiates, applied to both part and system. Death may take place by exhaustion. But more frequently the patient perishes under symptoms of ileus, the malignant deposit having advanced so as to cause complete occlusion of the bowel. Under such circumstances, the only hope of postponing death is by the formation of an artificial opening in the abdomen, for feculent evacuation; a very doubtful proceeding, as will afterwards be stated.

Medullary tumor sometimes forms between the bladder and rectum; causing great distress; interfering first with the functions of the rectum, and then with those of the bladder also. The treatment can only be palliative.

Irritable Rectum.

The lower bowel is liable to become the seat of Irritation, unconnected with any structural change; causing pain, heat, itching, frequent desire to go to stool, spasm of the sphincter, and sympathy of the urinary organs. The source of irritation may be within the bowel itself; ascarides. Or it may be contiguous: stricture in the urethra, or stone in the bladder. Or it may be remote, yet continuous: a depraved state of the mucous membrane of the stomach or upper bowels. Treatment is obviously to be begun by removal of the cause, if possible. Afterwards, opium, hydrocyanic acid, chloroform, or other calmatives, may be applied directly to the part, by means of injection, suppository, or injunction.

Itching of the Anus, an obstinate and distressing complaint—an irritation exterior to the bowel—is often the source of intense suffering to the patient. Generally, it is connected with a depraved state of the mucous membrane of the bowel; and removal of this, by the suitable alteratives—as tar, copaiba, arsenic, &c.—may suffice for cure. Sometimes it attends on piles or fissure; and is removed along with these ailments. Sometimes it is connected with a thickened and chapped state of the skin external to the anus; and in these cases, as well as in those where no local cause is apparent, applications to the part are essential. Of these the most successful are hydrocyanic acid, tobacco infusion, and camphor powder. The last may be used alone, or in combination with starch, and preceded by the application of a calomel ointment, ʒi—ʒii to the ounce.

Hemorrhage from the Rectum.

Bleeding from the lower bowel is usually an indication of piles, as has been seen; of the internal, vascular pile, more especially; and is almost always arterial. In females, however, it not unfrequently is found independent of prominent alteration in the bowel; oozing from the lining membrane, merely congested; and then usually periodic and vicarious. Or it is frequent and exhausting, proceeding from a small vascular eminence on some part of the membrane, discernible only by the use of the speculum. The treatment is obvious; according to the cause. Hemorrhoids are to be tied. The uterine function is to be restored, and the general frame amended. The vascular point is to be cauterized; and astringents are at the same time given internally—the best, perhaps, gallic acid. The tannin suppository may be used locally. In some way, the drain must be arrested (*Principles*, 4th Am. Ed. p. 326).

Injuries of the Rectum.

The anus is liable to wound and bruise, as other parts. The former may be formidable by hemorrhage; the latter by inflammation, leading to deep-seated abscess. Treatment is accordingly. A dangerous form of injury used to occur in hospitals, when the old-fashioned metallic syringe for giving enemata was recklessly used by ill-qualified administrators. The instrument's point, pushed rudely upwards, in a straight direction, is likely to lacerate the bowel. It may perforate; and then the injection, perhaps stimulant and acrid, finds its way into the areolar tissue, causing extensive abscess, and sloughing, with violent constitutional disturbance. In such cases, the remedy is to make a free and early incision into the infiltrated parts. But the modern enema-syringe, intrusted only to trustworthy hands, is not likely to lead to any such casualty.

Fæces and Foreign Bodies in the Rectum.

In the elderly of both sexes, but especially in the female, with whom irregularity of the bowels is more habitual, the fæces may accumulate within the sphincter, forming a tumor of large size, and occupying not only the whole rectum but also a portion of the sigmoid flexure. The symptoms are most distressing: painful fulness in the part, bearing down, frequent desire to go to stool, thin and scanty fluid passed, the bladder irritable, sleep disturbed, the stomach disordered, and more or less fever induced. Without examination, the affection may be mistaken for diarrhœa or dysentery; with an insufficient examination, the internal swelling may be supposed to be a malignant tumor. In cases of doubt, the finger's nail will bring away a sufficiency to test the nature of the concretion. In the milder cases, repeated injections of oil, followed by cathartic enemata, may suffice to clear the bowel. In the more confirmed examples, it is necessary to introduce the finger or fingers, with a lithotomy scoop, so as to break down the mass; afterwards clearing all away by injection. And two or more such operations may be necessary, at different times; as the higher accumulations may descend only after removal of those which occupied the lower bowel. Afterwards it is obviously of much importance to secure regular movement of the bowels; with a view to avoid re-accumulation.

Foreign substances may lodge in the lower bowel; causing inflammation, abscess, and ulceration there, if not removed timeously. They may be pushed upwards from without, by accident, or by malicious design. Or they may be arrested by the sphincter in their progress downward, having entered by the mouth; as fish-bones, bones of poultry or other small animals, kernels of fruit, &c. Or they may have formed, within the alimentary canal, intestinal concretions. The smaller substances are readily removed by finger and forceps. Large bodies require previous dilatation and lubrication of the bowel; and an exploratory use of the speculum may be useful. In extreme cases of impaction, it may be necessary to divide the sphincter. In the case of rough or sharp substances, whose forcible extraction in the ordinary way might seriously injure the bowel, a speculum is first carefully introduced past the foreign body, so as to sheathe and protect the mucous membrane.

Imperforate Anus.

Children are occasionally born with the anus closed. There are three kinds of this malformation. 1. The rectum may be fully developed, and have its orifice shut by integumentary membrane only; or the canal may be obstructed by a membranous septum, at some distance from the orifice—which latter may appear in all respects normal. 2. Or the bowel is imperfect; ending in a blind *cul-de-sac*, at some distance from the integument of the perineum, in which there is a mere depression or vestige marking where the anus ought to be. 3. Or the rectum is almost or altogether deficient; the sigmoid flexure of the colon terminating in a *cul-de-sac*, at the upper part of the pelvis.

The first form is easily managed. An incision is made through the occluding membrane; and for some days a piece of dressing is interposed, to prevent union. But often this precaution will be unnecessary; the passage of meconium and fæces sufficing to keep the aperture patent.

The second variety is more common, and more troublesome. Some thickness of parts intervenes between the operator and the bowel. And at first the latter may be felt but obscurely, if at all; there being none of the bulging fluctuation which must soon be apparent in the former case. Under such circumstances, we wait until the meconium accumulates, and till the bowel in consequence descends and is distended. It may then afford some indication of its presence to the finger from without. To assist, let firm pressure be made in the left hypogastric region; and such pressure should also be maintained, during the operation for relief. The cries of the child are of service. He is placed on the knee of a nurse or assistant, in a position as if for lithotomy. By means of a scalpel, an incision is made through the integument; and, by cautious dissection, the bulging *cul-de-sac* is sought for; the finger always preceding the point of the knife; the line of exploration following the natural curve of the bowel, in the hollow of the sacrum, lest the bladder or vagina should be wounded—not keeping too close upon the bone, lest the bowel be overpassed and be mistaken for the bladder—and not diverging to either side, lest the pelvic bloodvessels sustain injury. The *cul-de-sac* having been reached, is opened freely; the meconium escapes; and the wound is to be kept pervious by the careful and patient use of tents—or, what is perhaps better, by the constant wearing, for some time, of a tube such as is used after lithotomy.

After even deep dissection, we may fail to meet the end of the bowel. Then it is quite warrantable, to pass a trocar and canula upwards, cautiously, in the direction in which the bowel ought to be; and on withdrawing the trocar, we may have the satisfaction of seeing meconium follow.

Sometimes the deficient rectum opens into the vagina or bladder; constituting a *cloaca;* irremediable.

Of the existence of the third variety we are made aware, when, after waiting for days, not even the slightest indication of bulging or fulness can be detected in the perineum. A perineal wound and exploration may be made; but with scarcely a hope of success. And, failing in this, we have either to abandon the patient to its fate, or proceed to the establishment of an artificial anus.

The Formation of an Artificial Anus.

The question of artificially establishing an outlet for the contents of the intestinal canal, elsewhere than in the normal site, comes to be entertained, when the rectum is congenitally deficient, and also when it has become in any way insuperably obstructed, by simple stricture, or by carcinomatous and extensive degeneration, or by the impaction of an intestinal concretion or of some foreign substance from without. In the case of the child, probably the operation will seldom be deemed expedient; for when such a grave malformation exists—as entire deficiency of the bowel—others usually accompany it, rendering the viability of the patient under any circumstances very questionable. It were better to leave such to perish, by the original obstruction of the bowels, than to force on them a more miserable and scarcely less brief period of existence. In the case of malignant disease of the rectum, also, practitioners may well hesitate, before having recourse to a difficult and serious operation, for the purpose of attempting but partial and temporary relief, in an affection which must at no distant period end fatally. In such a case, it would seem to be warrantable only under the following circumstances: when the general strength is not yet greatly exhausted by malignant cachexy: when the obstruction in the bowel is complete, and plainly insuperable by any direct treatment; when the patient—having had the danger of the operation, and the almost disgusting result of its success, plainly exhibited—himself decides on its performance, and is prepared to abide both the nuisance and the risk. On the other hand, when the rectum is imperviously obstructed by the impaction of foreign matter from within or from without, or by disease not malignant nor necessarily and speedily fatal, and when such obstruction is other-

insuperable—the expediency of the operation may be safely urged
the patient.

e lower colon is plainly the part of the intestinal canal to be reached;
t may be sought, either from before, or from behind. The former
od, first proposed by M. Littré, is of easy performance; being
ly a direct incision upon the bowel through the abdominal parietes
eritoneum, above the left groin. The operation, however, though
simple, is hazardous to life; and, if successful, the anus is incon-
ntly situated, in one respect, the patient being the victim of dis-
ort to himself as well as the source of annoyance to those around
The site has its advantages, however, too. The operation is easy,
ts steps certain; the anus, after a time, gets to possess something
sphinctral power, from the muscular parietes; and the offensive
e of its contents may be guarded against by wearing a well-fitted
, the manipulation of which is easily within reach of the patient.

.e posterior operation, proposed by Callisen, and greatly improved
mussat, is performed thus; its object being to open the colon on its
rior part, where it is uncovered by peritoneum, and which bare
may be expected to be considerable when the bowel is much dis-
d by its contents. The patient is laid recumbent, with the trunk
somewhat to the right side; and with a pillow also placed beneath
bdomen, so as to make the left loin prominent. A transverse inci-
is made—about four inches long in the adult—midway between the
alse rib and the crest of the ilium; and if any considerable obesity
, the posterior part of the wound is crossed by a second incision,
lel to the range of the spinous processes. The different layers of
ascia, and muscle, are carefully divided in succession, on the out-
of the border of the sacro-lumbalis and longissimus dorsi; and por-
of fat, coming much in the way, may require to be removed alto-
r. Intestine having been exposed, some doubt may be felt as to
ing the colon or not; the bulging viscus at the bottom of the deep
d may be colon, or small intestine, or kidney. From the last, mani-
ion and percussion will readily enough distinguish intestine. And
reat gut may be distinguished from the small, by attention to the
ing circumstances:—the colon has its muscular fibres of greater
opment; the small intestines sustain a motion of alternate ascent
descent—communicated by the diaphragm, and corresponding to
ation and inspiration—while the colon is stationary, being fixed to
ins by areolar tissue; also, if two portions of bowel present them-
s, that may naturally be expected to be the colon which is on the
or spinal aspect, at the external border of the quadratus lumborum.
ng become satisfied that the colon is exposed at the bottom of the
d, it is transfixed by a needle and ligature—at two points, above
elow—so that it may not slip from its present relation to the wound,
an opening has been made and the contents have begun to escape.
bowel, stretched by the two ligatures drawn outwards, is divided
between. Air and fluid contents at once pass outwards; but it
be necessary, by means of the finger, scoop, or forceps, to assist in
sion of the solid matters. The margins of the opening in the bowel
ien secured by ligature to the external wound, so that, by adhesion

there, a permanent, safe, and efficient aperture may be constituted for fecal escape.

The advantages of this operation, in contrast with that of Littré, are —the peritoneum is uninjured, fecal escape is not so directly in the way of sight, and touch, and smell; there is less risk of prolapsus of the bowel, and control of evacuation is more complete; indeed a complete sphincter seems to form in the loins, rendering the occasional exhibition of aperients necessary. The objections are—this new sphincter is apt to exceed its office, rendering dilatation or fresh incision requisite to maintain patency of the opening; and the site is not readily within reach of the patient, for managing the pad which requires to be worn carefully adjusted. Great cleanliness must be at all times observed.

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CHAPTER XXX.

CALCULOUS DISEASE.

Urinary Calculi.

LTHY urine is a straw-colored or amber-colored fluid, retaining all nents in solution, with the exception of an almost infinitesimal ;y of mucus, which may in most cases be seen to subside after an r two from the transparent fluid, forming a very slight cloud at ttom of the vessel. In various states of disease, on the con- the solid matters contained in the urine are apt to be precipi- either in consequence of simple increase in their quantity rela- to the fluids, or from more complicated changes in the constitution secretion. Such solid precipitates, especially if composed of or crystalline matters, may give rise to distressing symptoms by in the urinary passages the formation of *gravel*, and of *stone* or *us;* the first term being applied to the finely granular form of , the two last to solid concretions of more considerable size. A once formed, has always a tendency to increase in size by new ons of foreign matter upon its surface; and in consequence cal- hen they have acquired sufficient size to be detained within the r or kidney, generally give rise to symptoms of increasing severity, ıy, sooner or later, require surgical interference for their removal. the study of urinary deposits is important in a surgical point of although the constitutional conditions which lead to them fall, for st part, within the province of the physician, like the other de- ıents of the urinary secretion. These conditions are commonly *diatheses*, and may be detected either by the occasional presence elly deposit in the urine, or by such changes in its chemical con- n, as are known to give a tendency to precipitation. The exist- any abnormal irritation in the urinary organs, should therefore cases lead to an examination of the urine, and particularly to observation of its sediments, if present, with a view to ascertain- d correcting any calculous tendency. Here, as in all other cases, tion is better than cure.

means necessary for the examination of urine in relation to sur- lisease, are—a good microscope with a magnifying power of at 00 diameters, a urinometer for testing specific gravity, test-tubes, pers, and a few simple chemicals, which will be mentioned imme- . By the conjoint employment of the microscope and of chemical analysis, after the manner so fully described of late years by Dr. Golding Bird and others, it is now within the power of every practitioner to detect even the earliest traces of calculous tendency; and no one can now be excused for overlooking derangements of the urine, which a few years ago would inevitably have been allowed to proceed unchecked, until they ended in calculous formation, or at least in the minor evil of gravel.

The normal urinary secretion usually yields, as above mentioned, a slight hazy cloud of mucous sediment, which forms its only precipitate in the state of absolute health. This cloud of mucus presents under the microscope only a very few rounded bodies, resembling closely the cells found in pus, and occasionally traces of epithelium cells from the bladder or some other part of the passages. Often, however, these are absent, or nearly so, and the sediment is altogether impalpable; occasionally, on the other hand, the so-called mucus corpuscles are increased in number, and the mucous cloud which contains them is increased in bulk and opacity. This is the first grade of mucous irritation, and is often found in connection with various kinds of saline deposit. Under a further progress of this condition the urine may become highly impregnated with mucus and epithelium; or the mucous cloud may be supplanted by a distinct deposit of pus.

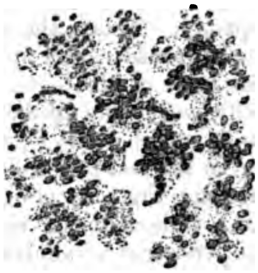
To the test-paper, healthy urine presents a tolerably distinct acid reaction; this may be feeble, or the urine may even be occasionally neutral, without the presence of any serious derangement; but any degree of persistent alkalinity must be regarded as distinctly abnormal, and requires correction by treatment, unless in the case of its having been induced by medicine or accidental dietetic conditions, which sometimes render the urine temporarily alkaline. According to Dr. Bence Jones, the acidity of the urine undergoes constant changes in amount in healthy persons, according to the condition of digestion; being invariably greatest immediately before meals, and falling to its minimum a few hours after breakfast and dinner; appearing therefore to stand in an inverse relation to the acidity of the stomach. The source of the acid reaction of urine is not known with certainty; it is supposed to be owing not to any free acid, but to the presence of some salt, such as the acid phosphate of soda.

The specific gravity of the urine, and the proportion of solid matter contained in it are likewise subject to considerable variation at different periods. After a meal and towards the close of digestion, the density of the urine (which has been called in these circumstances *urini chyli*) becomes greatest, and may exceed 1030, as tested by the urinometer. After drinking largely, on the other hand (*urina potus*), it may be reduced almost to the density of water; while the urine passed in the morning (*urina sanguinis*), independently of the influence of food or drink, has usually a specific gravity of from 1015 to 1025. The absolute quantity of urine passed in twenty-four hours varies, as might be expected, with the amount of drink; and has an inverse relation to the specific gravity, which is commonly high in proportion as the urine is scanty. About a quart (forty ounces) of urine may be assumed as an average quantity for an adult.

The principal sediments occurring in the urine, and tending to the formation of calculi, are as follows:

1*st.* Deposits of free uric acid, or urates of ammonia, lime, magnesia, and soda (*Lithi-uria*); 2*d.* Deposits of oxalate of lime (*Oxaluria*); 3*d.* Earthy phosphatic deposits, consisting of phosphoric acid, with lime, magnesia, and ammonia (*Phosphuria*); 4*th.* Deposits of a peculiar organic crystalline matter, termed cystin (*Cystinuria*); 5*th.* Deposits of another organic principle, scarcely crystalline, the uric oxide or xanthic oxide of Marcet (*Xanthi-uria*). Fibrin, carbonate of lime, and silica have also been mentioned as ingredients of calculi; but the deposition of these substances from the urine is extremely rare, and does not appear to have been the result of any peculiar morbid diathesis or tendency, the knowledge of which can be of any important use to the practitioner.

Fig. 205.



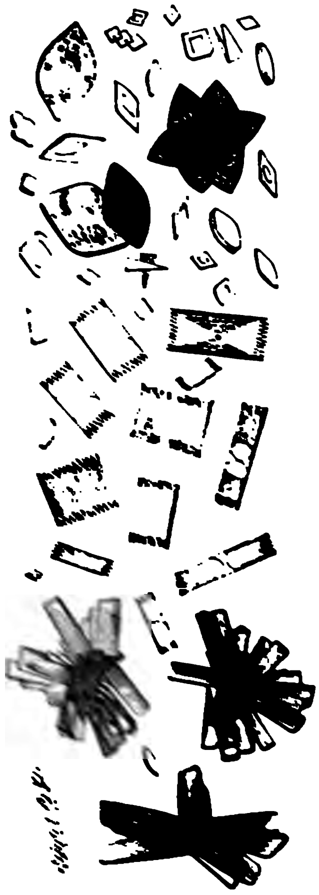
Urate of ammonia under the microscope.

The Lithic or Uric Deposit.—This consists either of the uric acid, or of the urates, tinged with coloring matter; and varies accordingly. 1. The most common is *amorphous;* consisting chiefly of the urate of ammonia; more or less colored; of a yellow hue, when mixed with the coloring matter of the urine; reddish like brick-dust, when combined with the purpurate of ammonia; and when this latter ingredient is in much abundance, the sediment is of a pink color. Such urine is unusually acid, when tested; is of high density; and has a small relative proportion of aqueous matter. When passed, it is clear; but, on cooling, the sediment is deposited more or less abundantly. 2. The *crystalline;* consisting of uric acid, variously tinged by admixture of coloring matter; usually of a reddish hue—the crystals resembling particles of cayenne pepper; and constituting the most ordinary form of gravel, or red sand.

Examined under the microscope the amorphous deposit, or brick-dust sediment, appears either in the form of exceedingly minute molecules, sometimes aggregated together, sometimes dispersed over the field; or in that of larger globular masses, semi-opaque, brownish in color, and sometimes either grouped together or armed with projecting spicula like stalactites. The last form is unusual, and has been considered by some observers as urate of soda. The crystalline deposit of uric acid assumes generally the form of rhombic prisms, but appears in various modifications of this primary type; the most usual is that in which the rhomboids or lozenges are very thick and rounded at the angles, so as to resemble, when placed upon their sides, thick cylinders, for which they may readily be mistaken, especially if grouped together in masses, as frequently occurs. The uric acid crystals are generally colored, and have, under the microscope, a peculiar deep amber tint, which is highly characteristic.

All the deposits of either free or combined uric acid are highly soluble in caustic potash; in soda they are less so. The urate of ammonia, which forms the principal part of the amorphous deposit, is tolerably soluble in water at the temperature of the body; and hence is seldom deposited except on cooling of the urine after excretion. In some cases, however, especially when the urine contains an excess of acid, the urate of ammonia is deposited within the bladder. The uric acid deposit, on the contrary, which is thrown down by the addition of almost any acid to urine holding urate of ammonia in solution, is soluble only to a very slight extent in water, even with the aid of heat; and hence is a comparatively frequent deposit in the urine on emission, although much less common than the amorphous sediment as a result of cooling. Both deposits are decomposed by strong nitric acid with the aid of heat, and leave on evaporation a beautiful lake-colored residue, which becomes purple in tint by the addition of ammonia (purpurate of ammonia, murexide). Urine containing these sediments is usually rather high-colored, of good or excessive specific gravity, highly acid and often scanty. Not unfrequently the amorphous deposit is not the result of any derangement of the system, but merely arises from deficiency of drink or abundant perspiration. This is never the case with the uric acid or crystalline sediment.

Fig. 206.



Crystals of Uric Acid.

Uric deposits may attend the slightest derangement of health, or the most serious; they denote a sthenic state of system, more frequently than the opposite condition. A trifling disorder of digestion, as by casual error in diet, may cause a tolerably copious sediment; the progress of hectic, and the decline of inflammatory fever, are accompanied by plentiful deposit of red powder—termed *lateritious*, from its resemblance to brick-dust. The gouty diathesis is marked by uric deposit. Habitual indulgence in much animal food, with deficiency of exercise, and neglect to maintain a clean and efficient state of the skin, will not fail to establish it. It is obviously connected with climate—at least with locality; the inhabitants of certain places suffering much more than others. It is also connected with age; prevailing most in childhood, and between the ages of forty and sixty. It is hereditary. It may follow injury of the kidney or its neighborhood; congestion being produced in the secreting organ. It would seem to depend proximately, either on an excess of uric acid being generated in the system—by decay of the effete organism, or by mal-digestion of food; or on the presence of a free acid—the muriatic, acetic, or lactic—which, combining with the bases frees the uric acid and so leads to its precipitation. Or the causes may be stated in another way, as by Dr. G. Bird: 1. Waste of tissues more rapid than the supply; as in fever, rheumatism, &c. 2.

Supply of nitrogen in the food, greater than is required for the reparation of tissues; as by excessive indulgence in animal food, and by too little exercise. 3. Digestion insufficient to assimilate an ordinary and normal supply of food; as in dyspepsia. 4. Obstruction to the cutaneous outlet for nitrogenized excretion; by skin diseases, or other cause. 5. Congestion of the kidneys; following injury of the organs, or disease wherein they are affected by sympathy.

Plainly, the treatment must vary according to the cause. In the fevers already mentioned, the deposit ceases as the constitutional symptoms subside. In other cases, the treatment may be said to be twofold. By the exhibition of alkalies, with which the uric acid combines, soluble salts are formed, while at the same time—mainly perhaps by the vehicle in which the alkali is given—the aqueous portion of the urine is increased. And by attention to regimen, exercise, and skin—going more deeply into the matter—we seek to rectify the depraved state of the digestive organs, on which the evil in the great majority of cases primarily depends. Both methods are of service; but the latter is obviously the more important. They are usually combined. Magnesia, soda, and potass may be given. The first may accumulate in the intestines; and on this account is seldom prescribed, at least for any length of time. The phosphate of soda is both safe and useful. The carbonate is grateful, and quite efficient. But potass is usually preferred: its urate being more soluble than that of soda. The bicarbonate is usually given in half drachm doses; largely diluted; and it may be pleasantly combined with a few grains of citric acid. The best period for administration, probably, is about two hours after the principal meals—when alkalies are most wanted to neutralize the free acid of indigestion; and when at the same time digestion is so far advanced as to render it unlikely that this process shall be interfered with by the alkali. There are also the borate, citrate, and tartrate of potass—all available.

Simple though the alkaline remedies seem, let them never be persevered with carelessly. Their over-sustained use may convert the sthenic state of system into the asthenic, inducing serious constitutional disorder, and causing an ammoniacal and phosphatic state of the urine.

The test-paper must be used from time to time, and the state of the system must be carefully attended to.

In those cases in which digestion is obviously weak and imperfect, preparations of iron are useful; the citrate, in solution, may be given in moderate doses after each meal. Regimen is carefully attended to; food being regulated as to both quantity and quality. Nothing at all approaching to a surfeit should ever be indulged in; animal food should be taken sparingly, if at all; vegetables and farinaceous articles may be freely used, provided acidity be not produced; malt liquors should be abstained from; and wine, if taken at all, must be used with great moderation. The bowels require laxatives or alteratives. In most cases, a mercurial purge is a good beginning of the treatment; and, if the sthenic constitutional symptoms amount to a febrile character, cupping may be also practised on the loins. The skin must be attended to; by ablution, warm clothing, friction, and exercise; and if any eruption exist, means must be taken to remedy that. Occasionally, gentle diuretics would seem to be of service. Colchicum, it is well known, is a powerful eliminator of uric acid; and hence, probably, the main reason of its success in gout and rheumatism. When congestion of the kidney is suspected, the treatment is by cupping, rest, and antiphlogistic regimen.

The term "*gravel*" is ordinarily applied to the passing of the uric acid deposit. It begins severely, and is liable to aggravations; and these periods of intensity are termed "fits of the gravel"—characterized by pain in the lumbar region, shooting down towards the groin, with pain and retraction of the testicle; frequent micturition, hot and scalding; uneasy sensations in the thighs, very frequently; more or less febrile disturbance; and always plain indications of great derangement of the digestive organs. It is in such cases that purging, antiphlogistic regimen, and sometimes local bloodletting, form so excellent a commencement to the remedial means.

The ordinary treatment may be reduced to the following indications: 1. To diminish the uric formation; by moderate antiphlogistics; regulation of diet and exercise; and attention to the skin. 2. To increase the solvent power of the urine; by diluents, given cold—yet not so as to discourage perspiration; and by gentle diuretics, if necessary. 3. To increase the solubility of the deposit; by preventing or neutralizing the free acid, which, spoliative of the urate's base, causes precipitation of the uric acid; and by presenting an alkali as a soluble base to the uric acid. 4. The fourth indication is one of no slight importance—to favor extrusion of the gravel; by diuretics and diluents; by warm bathing; and by exercise. And, in regard to this, it is well to remember that the particles of uric gravel are especially prone to aggregation.

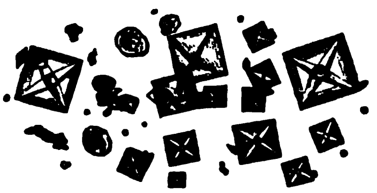
The Oxalate of Lime Deposit.—The occurrence of oxalate of lime in the urine as a source of calculus has been long known; but the frequency of this deposit was much underrated, until the careful researches of Dr. Golding Bird, who first investigated the form of its microscopic crystallization, and the symptoms connected with its occurrence in the early stages. It constitutes a species of very minute crystalline gravel, which readily escapes observation by the naked eye, in consequence of the perfect transparency and absence of color in the crystals. On careful observation, however, they may often be seen as minute glistening points floating in the urine, which usually contains a slight excess of mucus, but is often nearly or absolutely clear.

The crystals are probably precipitated within the organism in most instances; they may, however, be absent from the urine on emission, and be found in great abundance twenty-four hours afterwards. The mode in which they are retained in solution is not known, as the oxalate of lime is exceedingly insoluble in water.

With the exception of a rather high specific gravity, which is usual, there is nothing very characteristic in the appearance of urine containing oxalate of lime. The amount of urea is generally large; often, also, uric acid and its salts are in excess, and sometimes they form deposits which coexist or alternate with those of the oxalate. The earthy phosphates are likewise usually in excess in oxaluria, but are held in solution in consequence of the acidity of the secretion. The color of the urine varies from a pale straw-color to an amber tint, the latter being perhaps more common and characteristic. The urine in this disease generally, as already mentioned, deposits an excess of mucus; and along with this there are sometimes found minute quantities of seminal fluid, as indicated by the presence of spermatozoa under the microscope.

The most usual form of the oxalate of lime as seen under the microscope is that of octohedral crystals, generally not more than $\frac{1}{1000}$ or $\frac{1}{2000}$ of an inch in diameter, and often much less than this; always perfectly transparent, colorless, and exceedingly sharp and well defined in their angles. Occasionally the crystals are "made up of a square prism, with a four-sided pyramid at each end, forming a dodecahedron." Another form, much more rare, and possibly not composed simply of oxalate of lime, is that of dumb-bell shaped or oval crystals, often resembling "two kidneys with their concavities opposed," and possessing a beautiful radiating structure in some cases, while in others they appear homogeneous. The crystals are insoluble in alkalies or in vegetable acids; soluble in muriatic and nitric acid; and on being subjected to a red heat are decomposed, leaving carbonate of lime, which dissolves with effervescence on the addition of acids. In regard to the pathological or physiological origin of oxalate of lime, in the economy, many speculations exist; but none of them are sufficiently precise or well founded to claim attention in a practical work. It is very probable that this deposit has some relation to the decomposition of the tissues, and is formed at the expense of urea or uric acid.

Fig. 207.



Oxalate of lime under the microscope.

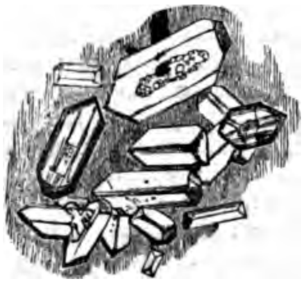
The attendant constitutional symptoms are occasionally slight; commonly, however, they are sufficiently characteristic and distressing to require attention and treatment. The patient is languid, weak, and thin; often remarkably depressed in spirits; usually pale, sometimes of a greenish hue in the face—more especially about the eyes and mouth; pustular formations on the skin are common; and so are scaly eruptions; the slightest exertion induces great fatigue; the temper is irritable; the mind broods over the ailment, and desponds of recovery; dyspepsia is present—troublesome, by flatulence and palpitation, more especially after taking food; aching pain is complained of across the loins; and the sexual power is usually much impaired. Sometimes the symptoms of phthisis are simulated; sometimes those of heart disease. Not unfrequently, water is made with unusual frequency, and with heat and smarting.

The ordinary causes of this affection are, over-exertion of mind or body, excess of venereal indulgence, habitual and gross errors of diet, exposure to cold, injuries done to the lower part of the spine. The oxalic acid would seem to be the product of faulty assimilation; and it readily meets with its base. According to some, the acid may be introduced from without; it being supposed to be one of those substances which are capable of passing unchanged from the stomach to the kidneys. According to this view, the taking of rhubarb, sorrel, tomata, &c., as articles of food, along with the use of hard water as drink, may be deemed very favorable for the establishment of the oxalate of lime deposit.

The treatment resembles that for the phosphatic diathesis. The general functions are looked to; but more especially those of the stomach and skin. Diet is light and nourishing. Malt liquor is forbidden; and a sparing allowance of brandy and water, with meals, is found preferable to wine. Sugar is abstained from. Warm clothing must be worn; and by friction, exercise, and warm bathing, the pores are to be kept free. All sources of exhaustion, and all kinds of depletion are to be avoided. Medicinally, the mineral acids are found of much service; especially the nitro-muriatic, exhibited in some bitter infusion. And, of the tonics, zinc and iron are to be preferred; the sulphate of zinc more especially. Colchicum, too, may be found useful. It is well to remember that, in treatment, the oxalic often changes into the uric diathesis; indeed it is probable that these two morbid states readily pass into each other—it costing the urea, as it were, but little effort to change into either the uric or the oxalic acids. When, under treatment, the uric deposit is observed to succeed the oxalic, the use of the acids must be abstained from, at least for a time.

The Phosphatic Deposit.—Normal urine contains a considerable proportion of phosphoric acid, the greater part of which is in combination with alkaline bases, and forms salts which are highly soluble. The phosphates of lime and magnesia exist also in small but very variable quantity, and are held in solution, probably by the acid of the urine, along with some of its saline constituents. These earthy phosphates are in greatest quantity after a meal, in healthy persons; and in various diseases, especially those attended with emaciation, appear to increase in amount. They are precipitated, and form a slight cloudiness in the urine, on the addition of any caustic alkali or alkaline carbonate; and when healthy urine passes into the state of decomposition, the earthy phosphates are also thrown down, owing to the evolution of carbonate of ammonia from decomposing urea. The precipitate may be either amorphous or crystalline. The former generally consists of phosphate of lime; the other of the triple phosphate of ammonia and magnesia. This last, in a nearly neutral urine, crystallizes in triangular prisms bevelled at one or both ends, exceedingly transparent and colorless, like the prisms of crystal used in optical experiments. These crystals are very friable, and are consequently often observed irregularly splintered, or shivered into small fragments; they are always perfectly colorless, and by this character are easily distinguished from uric acid. In a highly alkaline urine (whether spontaneously alkaline or decomposed after emission), the phosphate of ammonia and magnesia occurs under a variety

Fig. 208.



Crystals of the Ammoniaco-magnesian Phosphate.

of crystalline forms, corresponding to the basic varieties of the salt. "When rapidly formed, this salt generally appears in the form of six-rayed stars, each ray being serrated, or irregularly crenate, often runcinate, like the leaf of the taraxacum." There are, however, many varieties of star-shaped and foliaceous crystals, consisting of basic triple phosphate; and generally these are mixed with the neutral salt in the ordinary prismatic form above described. All the forms may be readily produced artificially, by adding ammonia or its carbonate in different quantities to the urine.

The phosphatic gravel is usually white or pale gray—whether amorphous or crystalline; it may be precipitated in the form of plain gravel, or it may be either suspended or precipitated in a cloud resembling that of mucus, or it may form as a pellicle on the surface of the urine. The urine is pale and copious; of low density; occasionally alkalescent, when voided; never more than very faintly acid; often turbid, the last portion which is voided presenting a milky appearance—the phosphates being already precipitated; sometimes it emits a heavy, sickening flavor, somewhat similar to that of weak broth; not unfrequently it is ammoniacal from the first, dark-colored, and loaded with mucus; in all cases, it very soon putrefies, precipitating the deposit copiously, and exhaling a very offensive odor. Very generally, an iridescent pellicle forms on its surface; consisting of minute shining crystals of the ammoniaco-magnesian phosphate.

The symptoms which attend the continuance of phosphatic deposit, are invariably of the asthenic type. The patient is pale, weak, nervous, irritable; incapable of sustained exertion of either body or mind; the bowels are flatulent and irregular; and an oppressive, exhausting pain, or aching, is almost constantly complained of in the loins.

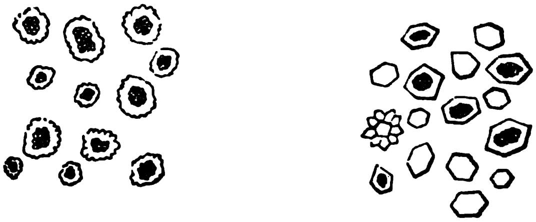
The cause may be local or constitutional. Whatever tends to exhaust the general, and more especially the nervous system, tends to induce this deposit; over-exertion, especially of mind; insufficient food; the habitual use of depressing medicines, as mercury, alkalies, saline purgatives. Also, this deposit is a frequent consequence of injured kidney, and of injury to the spine; and it is an almost invariable attendant on confirmed disease—more especially if organic—in the bladder, kidney, ureter, or prostate. An occasional deposit of phosphates may follow a slight and transient cause; as error in diet, or profuse perspiration under violent exercise. But continuance invariably denotes broken health. The least formidable cases are those in which the ammoniaco-magnesian phosphate alone is found; and the worst are usually those in which the deposit consists of a combination of this salt with the phosphate of lime.

Happily, the phosphatic gravel is not prone to agglomerate within the bladder, unless a nucleus be present; then, however, the cohesion of particles, around this, takes place rapidly.

In treatment—as in that of the uric deposit—we have to direct attention both to the deposit, and to the causes which lead to its formation. The mineral acids—as the muriatic, nitric, or a combination of both—exert a double influence; they increase the solubility of the phosphates, and at the same time give tone to the primæ viæ and general system. They are given in doses of a few drops, much diluted, and gradually increased. Regimen is carefully attended to. Food should be generous, yet light and moderate; consisting chiefly of solids. Acescent vegetables, fruits, and drinks are injurious; for, however useful the mineral acids, taken from without, may be, acids engendered within invariably betoken derangement of stomach, and that as invariably reacts most untowardly on the urinary organs. Wine may be taken sparingly. Over-exertion in any way is avoided; free air and laxity of occupation are to be sought; and the skin's function must be well looked to. The bowels are regulated; but mercury and saline purges do harm. Diuretics are not given; neither are alkalies—unless indeed the acids of indigestion plainly are troublesome, and then very small and occasional doses of alkali may be of service. Depletion, in any way, is not to be thought of. Opium is of much service; by subduing the irritability of system. General tonics are plainly indicated. And the decoctions of the diosma crenata, pareira brava, and uva ursi, would seem to exert a beneficial influence specially on the urinary system.

The Cystine or Cystic Oxide Deposit.—This deposit is rare; but as it causes one of the most obstinate forms of the calculous diathesis, it is necessary to mention it here. Cystine is always crystalline, though to the naked eye it scarcely appears so, having more resemblance to the paler forms of lithate of ammonia. It forms a yellowish sediment insoluble by heat, unaffected by vegetable acids, but dissolved by strong mineral acids and alkalies. Ammonia dissolves it very readily, and on evaporation deposits it unchanged in the crystalline form. Under the microscope cystine appears in the form of hexagonal plates, often overlapping each other so as to form rather a confused mass. The ammoniacal solution, slowly evaporated, gives crystals which can usually be distinguished from all others without difficulty.

Fig. 209.



Crystals of Cystine.

Urine containing cystine is usually of a more or less deep yellow color, sometimes inclining to green. Dr. Goldiug Bird has even seen it grass-green. Its odor is either aromatic like that of sweet-brier, or slightly fœtid. The quantity of urea and of uric acid has generally been found below the average; and it is not improbable, from the chemical relations of cystine, that it is formed at the expense of these physiological products. Cystine contains a large proportion of sulphur (26 per cent.) and is therefore probably in some way related to the sulphur-extractive which is found in normal urine. Pathology has not yet succeeded in throwing any useful light upon the circumstances under which the cystine diathesis occurs; the rarity of this deposit proving, *fortunately*, an obstacle to the extension of our knowledge in that direction.

occurrence is occasionally hereditary; and appears to be little subject ıny therapeutical control.

The Uric or Xanthic Oxide Deposit.—This is the rarest of all the nary deposits; and was first described by Dr. Marcet, as the conuent of a calculus weighing eight grains. Neither its pathological tory, nor its chemical properties and relations, have been so clearly ertained as to demand notice in a practical work. It has chiefly been covered in children, in the form of calculus. Dr. Douglas Maclagan ely found in the urine of a hysterical female traces of what appeared be uric oxide; and his investigations led him to regard the substance nd in this case as identical with one of the normal coloring matters the urine, precipitated upon a basis of earthy phosphates. It showed ler the microscope granular laminæ, of irregular form, having the mical characters described as those of cystine.[1]

Formation and Varieties of Calculi.

The persistent establishment of any of these deposits renders the ient more or less liable to the formation of calculi, and is therefore tly regarded as a calculous diathesis. A nucleus having formed in ıe part of the urinary passages, the particles of the prevailing deposit aggregated around it, sometimes in a homogeneous manner, more ıerally in layers, which may not unfrequently differ widely in compoon. The nucleus may come from within or from without. A foreign stance introduced into the bladder, by the urethra, by wound, or by eration, and remaining in that viscus, soon becomes coated by calcus matter, even though previously no tendency to such deposit existed. rley-corns, straws, beans, portions of bougies, or bullets, which have dually worked their way inwards, may thus prove nuclei; also portions nstruments, lint, or other matters, used in operations on the bladder; a portion of necrosed bone may find its way, by ulceration and abscess, the viscus. By far the most common nucleus, however, is provided the urinary organs themselves. A few particles of uric acid, or of late of lime—for these, the former more especially, are found to be st prone to formation in the kidney—become coherent immediately er secretion; and by such aggregation a nucleus is at once formed, citing further addition. This addition may be made at the original of aggregation, the kidney; more frequently, however, descent takes ce into the bladder; and the small renal concretion then becomes nucleus of a vesical calculus. Or blood, escaped from the kidney mucous coat of the bladder, may afford a mass of fibrin, which in manner may originate the formation; all the more readily, of course, a gravelish tendency previously exist. As the stone enlarges, the ginal nucleus usually retains its central position; the stone moving ely in the bladder, and receiving addition equally on all sides. Somees, however, the stone is found to occupy a steady position, even en not encysted; lying undisturbed behind an enlarged prostate, ing one side in constant and immediate contact with the mucous nbrane, and presenting only a part of its periphery to the source of litional deposit. In such cases, the nucleus will be found occupying a lateral position in the stone's section; enlargement having taken place almost exclusively on that aspect which looked into the free interior of the viscus.

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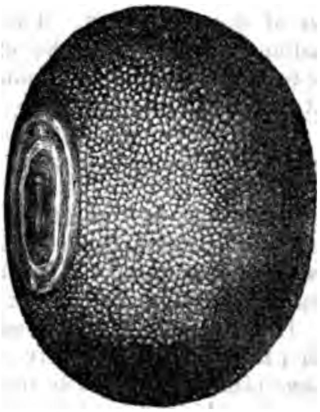
[1] Monthly Journal, August, 1851, p. 131.

Stones vary in their nature according to the diathesis which prevails during their formation. The following are the varieties:

I. *The Uric Calculus;* consisting chiefly of uric acid, but often containing a greater or less proportion of urate of ammonia. This is by far the most common class; comprising probably about two-thirds of all calculi. The color is brownish-red, sometimes like that of mahogany; the surface is either quite smooth, or finely tuberculated by crystals; a section shows aggregation of the particles in a concentric arrangement; the form is generally oval; and the size may vary from that of a pea to that of an orange. The tests are—solubility in caustic potass; gradual consumption before the blowpipe; digestion in nitric acid, and gentle evaporation, producing a scarlet residue, which becomes purple on the addition of ammonia.

Fig. 210.



[Uric Calculus, showing its finely tuberculated surface. (From Gross.)]

Fig. 211.

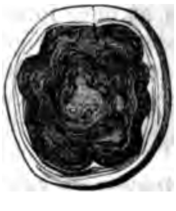


Fig. 212.

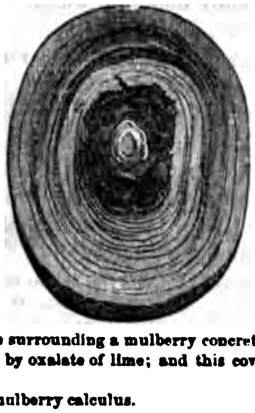


Fig. 213.

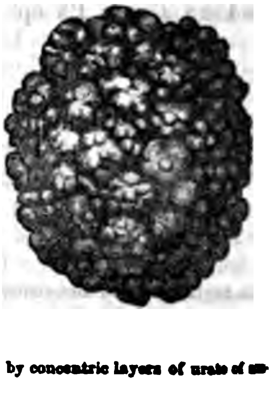


Fig. 211. The triple phosphate surrounding a mulberry concretion.

Fig. 212. Nucleus surrounded by oxalate of lime; and this covered by concentric layers of urate of ammonia. From a child.

Fig. 213. Oxalate of lime, or mulberry calculus.

I. *Urate of Ammonia Calculus.*—This salt, as just stated, enters e or less into the construction of the uric calculi. Sometimes, but ly, it forms a concretion by itself. The surface is similar to that of uric; more frequently tuberculated than smooth; it is of a clay r; the fracture is fine and earthy; and the layers are concentric. s comparatively rare calculus is peculiar to children. The tests are or the preceding; with this addition, that ammonia is evolved during tion in potass.

II. *The Oxalate of Lime, or Mulberry Calculus;* not unlike a berry in size, form, and color. By no means unfrequent, especially oung people; always of slow formation. The color is dark brown; sity and weight are comparatively great; the surface is almost always ely tuberculated; the texture is imperfectly laminated; the size seldom eds that of a walnut; and the stone is always single. The tests are olution in nitric acid; the blowpipe, consuming the acid, leaves k-lime in powder, which, if moistened, gives to turmeric paper a red n.

mall calculi of oxalate of lime, in size, form, and general appeare, very like hempseeds, sometimes form in the kidney. Descending may be extruded with the urine; but if one remain in bladder, it becomes variously coated, according to the hesis that prevails. If the oxalic diathesis continue, the pseed sooner or later passes into the mulberry formation.

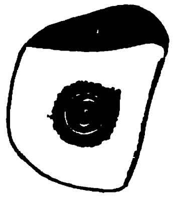
Fig. 214.

[Hemp-seed Calculus. (From Gross.)]

V. *Phosphate of Lime Calculus.*—Calculi seldom consist his salt alone. When they do, the surface is smooth like of porcelain; the color is a pale brown; the texture is larly laminated; the form is spheroidal. The stone is ble, and usually of small size. The tests are—solubility in ic and muriatic acids, and precipitation by liquor ammoniæ; resise to the blowpipe, unless at a very intense heat.

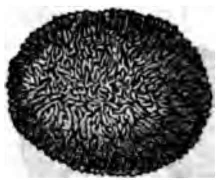
. *The Ammoniaco-Magnesian Phosphate Calculus;* commonly d the Triple Phosphate Calculus—although that term might with as much accuracy be applied to the next variety. This and the wing seldom occur as composing stones entirely; but rather as coator layers of others—the uric and oxalate of lime more especially. color is nearly white; the surface is covered with minute shining tals; the texture is not laminated, or at least is imperfectly laminad; the stone is soft, easily broken and pulverized, and may attain

Fig. 215.



Triple phosphate, surrounding a centre of Uric Acid.

Fig. 216.

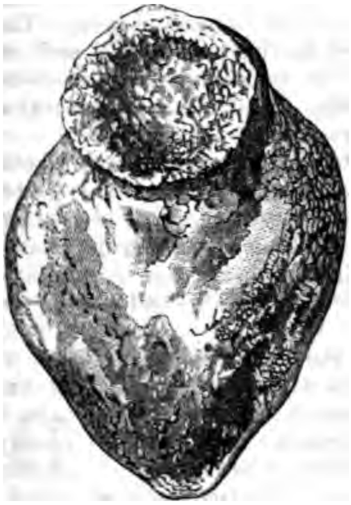


[Calculus of Ammoniaco-Magnesian Phosphate, entire, exhibiting its shining crystalline surface. (From Gross.)]

to a large size. The tests are—solubility in acetic or muriatic acid; evolution of ammonia, when treated with liquor potassæ; dininution and imperfect fusion under the blowpipe, exhaling an ammoniacal odor.

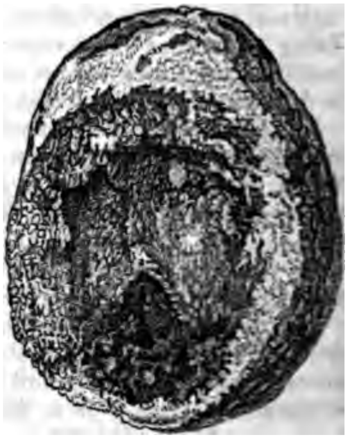
VI. *The Fusible Calculus;* composed of the ammoniaco-magnesian phosphate, conjoined with phosphate of lime; is white and friable, like chalk; and may stain the finger when touched; the size and form are very various. The test is, its remarkable fusibility before the blowpipe.

Fig. 217.



[Fusible Calculus. (From Gross.)]

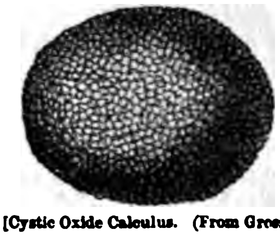
Fig. 218.



[Section of the same, showing its internal structure. (From Gross.)]

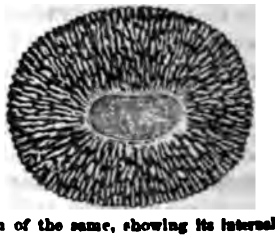
VII. *The Carbonate of Lime Calculus* is common in the lower animals, but rare in man. It is white, spherical, smooth, and very friable; and dissolves in muriatic acid, with effervescence.

Fig. 219.



[Cystic Oxide Calculus. (From Gross.)]

Fig. 220.



[Section of the same, showing its internal crystalline appearance. (From Gross.)]

VIII. *The Cystic Oxide Calculus* is also rare;[1] of a yellowish-white color; the surface smooth, but of a crystallized appearance; not laminated in texture, but presenting the appearance of a confusedly crystallized mass; the fracture exhibits a peculiar shining lustre; small fragments are semi-transparent. The blowpipe elicits a peculiar odor, like that of sulphuret of carbon; and there is a ready solubility in alkalies and mineral acids.

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[1] I had occasion to remove a calculus of this nature, successfully, from a patient on whom Mr. Liston had removed a like stone fifteen years before.—*Monthly Journal*, 1849, pp. 791 and 886.

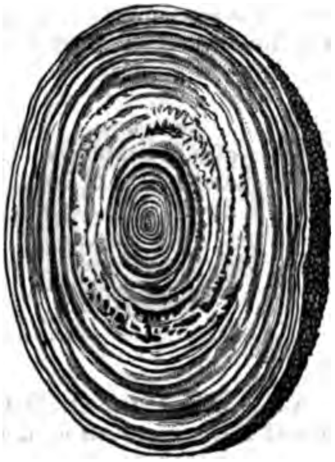
IX. *The Uric or Xanthic Oxide Calculus* is still more rare than either of the preceding. The texture is compact, hard, and laminated; the surface is smooth, the shape ovoid, the color cinnamon-brown. The tests are, consumption before the blowpipe, leaving a white ash, and exhaling a peculiar fetid odor; solubility in acids and alkalies—more readily in the latter; the residue of solution in nitric acid, evaporated to dryness, of a bright lemon-yellow color—whence the name.

X. *The Lithate of Soda* sometimes enters into the composition of calculi; but very rarely constitutes a calculus, of itself. The mass is white, friable, and soft, like what is seen in the tophous concretions of gout, in the neighborhood of joints. The tests are—solubility in caustic potash, with the aid of heat; in treatment with dilute sulphuric or muriatic acids, the soda is separated, while the uric acid remains and may be obtained by filtration and washing.

XI. *The Fibrinous Calculus*, like the xanthic oxide, occurs with extreme rarity. And, perhaps, the term calculus is scarcely applicable to the almost solitary case on record; in which small concretions were passed, of the size of peas, yellow, like wax, and composed of fibrin—probably the result of a bloody clot, in either the kidney or bladder. Such formations, however, as already stated, may not unfrequently constitute nuclei of the ordinary calculi.

XII. *The Alternating Calculus*, though last in the arrangement, is not the least frequent in occurrence. Few large calculi, indeed, fail to present more or less of the alternating character; the nucleus consisting of uric acid or oxalate of lime; variously coated or alternated; the last covering invariably phosphatic, and most frequently of the nature of fusible calculus. The mulberry or uric calculus, having formed, creates much irritation in the urinary organs, and causes changes also in the general system for the worse; the urinary secretion becomes more and more depraved; and at last that derangement is produced which is favorable to the formation of the ammoniaco-magnesian phosphate; this is deposited on the growing stone, and, uniting with phosphate of lime now furnished by the diseased mucous membrane of the bladder, constitutes the fusible formation.

Fig. 221.



Section of an Alternating Calculus; chiefly composed of uric acid.

Such are the varieties of Urinary Calculi. Those ordinarily occurring are, the uric, mulberry, phosphatic, and alternating. Forming in the kidney, and tinue in any of these cavities for some time, a peculiarity of shape is acquired—diagnostic of such formations—dependent on the form of the cavity; in fact, the stone—though at first small, oval, and smooth, like uric calculi in general—may often be said to be an accurate cast of the pelvis and infundibula. This happens when the calculus continues to be renal; more frequently, however, it descends by the ureter to the bladder; thence to be expelled by the urethra, or to enlarge into a vesical calculus. If it remain in the kidney, serious changes take place in that organ. The cavity or cavities are completely occupied; then, the size increasing, encroachment by pressure is made on the texture of the gland, until this may come to consist of little more than a mere cyst within which the large stone is contained. Sometimes active inflammation is kindled; the kidney suppurates; the matter, obeying the general rule of seeking the external surface, may point posteriorly; and, evacuation having taken place, the stone may be felt by the probe or finger.

The symptoms of stone in the kidney are generally as follows: A dull aching, with a sensation of weight, is felt in the loins; with a sharp pricking feeling in the region of the kidney. Sometimes there is pain in the scrobiculus cordis; sometimes there are fits of vomiting; generally the stomach is irritable. The urine, from time to time, shows an admixture of blood, more especially after exercise; and this, when rude and violent, aggravates all the symptoms. Water is made often, and with pain and heat; the testicles are painful and retracted. Numbness, pain, and cramp in the corresponding thigh are very common. Febrile aggravations are liable to occur, the kidney becoming the subject of intercurrent seizures of an inflammatory nature. Purulent matter may descend from the pelvis, and be voided with the urine; and by continuance of such discharge, by the hematuria, by the pain and general disorder, serious exhaustion may ensue. Generally, irritation descends; and the bladder ultimately sympathizes more or less, by functional or organic disorder. Large calculi, occupying the whole gland, may sometimes be felt by external manipulation; and, in the open suppurated condition, a very accurate diagnosis may be arrived at, as already stated.

Generally the stone, at no long period after its first formation, descends by the ureter; this movement being induced by its own weight, and by the flow of urine. Sometimes, however, it is arrested in the passage; an event towards which the irregular form of the calculus is manifestly favorable. The ureter may be, in consequence, either wholly or partially obstructed. Usually the form of the calculus is such as to favor the urine's escape by its side; but still even such partial obstruction, if long continued, may lead to very serious results; dilatation of the ureter above, of the kidney's pelvis, and of the infundibula; absorption of the proper structure of the kidney; and consequent interruption to the function of that important organ. Indeed, under such circumstances, the parts have been found reduced to the condition of a chronic abscess; the distended pelvis and infundibula being coated with a false membrane, and secreting much puriform fluid. And other dangers attend on the arrest; inflammatory disease, kindled in the obstructed part, may extend to the parts adjoining, and may involve the abdomen in peritonitis; or ulceration may take place, with perforation; and through the aperture fatal urinary extravasation may occur. Complete obstruction by the arrest is fraught with utmost peril; distension of the pelvis and infundibula, rapid and great, is likely to cause suppression of urine—always most hazardous; there is a greater risk of inflammation and ulceration than in the partial case; and the over-distended ureter may even give way by bursting. In the case of partial obstruction there is a chance—though a remote one—of ulceration proving chronic and sthenic; preceded and accompanied by plastic exudation, and consequent consolidation of tissues; advancing towards the surface; and ultimately discharging the offending body externally. Or the calculus may remain in the ureter with partial obstruction; as it enlarges, it usually assumes the form of an hour-glass, the increase of deposit taking place chiefly at either extremity; and sooner or later death is the result. Not unfrequently, a descending stone is arrested in the termination of the ureter; one part within the ureter, partially obstructing it; the other projecting into the cavity of the bladder, and receiving increase there; constituting a troublesome variety of vesical calculus.

A small, smooth calculus may glide down the ureter imperceptibly. More frequently, descent is marked by symptoms. The patient is sick and vomits; he is alarmed, feeling a change, and afraid of the result; he is attacked by cold chills and shivering; the pain shifts from the kidney, shoots downwards in the course of the ureter, and often down the corresponding thigh—intense, and sometimes almost insupportable; the testicle is retracted and painful—the seat of neuralgia, or irritation; sometimes the irritation induces the inflammatory process, and acute orchitis results. The pulse is comparatively little affected, but fever may at any time supervene, in consequence of inflammatory seizure in the ureter, kidney, bladder, or testicle. If arrest and obstruction take place, all the symptoms are much aggravated.

The treatment of renal calculus consists in favoring descent, and palliating the urgency of the symptoms. The warm bath relaxes; opium does the same, and assuages pain; purgatives and diuretics favor descent. Smart exercise is also of service. In the first instance, antiphlogistics are not demanded; they are held in readiness for the threatening of inflammatory action. Not the least important part of the treatment is the adoption and maintenance of such means as are best suited for overcoming the diathesis on which the existence of the stone depends. Should there be reason to apprehend arrest in the ureter, with complete or even great obstruction, diuretics, and diluents will of course be refrained from. When, however, descent has been completed, and the bladder is reached, diluents can hardly be plied too actively, so as to favor complete expulsion of the foreign body.

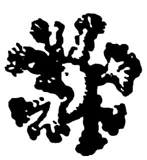
When a large stone lodges in the kidney, and its presence can be made out with tolerable certainty, nephrotomy has been proposed; cutting into the gland from behind, and extracting the stone. This is not warrantable, however, except in those cases in which Nature has effected the greater part of the procedure; when suppuration has taken place; when the textures intervening between the stone and the surface are matted together and consolidated; when the stone has become superficial; and when, in short, there is no risk of injury being done to the abdominal cavity. Then the pointing abscess may be opened, or the aperture already existing may be enlarged, and the stone may be seized and removed. Such cases, however, are very rare, as can readily be understood.

Vesical Calculus.

As already stated, vesical calculus may originate in the bladder formed on a nucleus there. More frequently it may be said to be a continuation of the renal concretion. On descent having been completed, the sufferings which accompanied it generally cease; the patient enjoys a period of comfort; and he is apt to imagine himself rid of the malady. Uneasiness, however, returns; and in no long time the symptoms of stone in the bladder become marked and characteristic. The water is passed with unusual frequency, and with more or less pain. Desire to evacuate the bladder is not only frequent, but sudden and irresistible; and the evacuation does not bring relief. On the contrary, the pain, which existed during micturition, is aggravated when the bladder is empty, and when spasmodic contraction of the middle coat brings the morbidly sensitive mucous membrane into direct and rude contact with the calculus. The pain is referred chiefly to the point of the penis, with a sensation as if something lodged there; and, in consequence, the prepuce and end of the glans are liable to be pinched and pulled by the patient involuntarily. This especially takes place in children; and in them it is common to observe the forefinger and thumb pale and sodden in their points like those of a washerwoman. We may find elongation and œdema of the prepuce, from the same cause. A slight change of posture may induce the desire for micturition. It is sure to be induced and aggravated, as well as the pain, by exercise; mere especially, by being roughly jolted in a cart or other carriage; and then, too, we may expect the urine which is passed to be more or less bloody. A stooping posture is usually adopted during micturition; sometimes the patient rests on his knees and elbows; sometimes he leans over and rests on his head; the object being to avert pain, by removing the calculus from the most sensitive part of the bladder—the trigone. The water at first may flow in full stream, and then may stop suddenly; the stone having moved to the posterior orifice of the urethra, and temporarily occluded it, causing aggravation of pain. By change of posture, the stone is dislodged, and the flow restored. The stone, acting constantly as a source of irritation to the lining membrane of the bladder, induces congestion there; increase and change in the secretion result; mucus coming in greater quantity, and more viscid than usual;—a wise provision, the tenacious mucus adhering to the membrane from which it was secreted, and protecting it, to some extent, from injurious contact with the calculus; what is redundant is discharged with the urine. And hence a common symptom of stone is, the presence of such mucus in the urine; settling down in the bottom of the pot, and often showing itself there in great quantity, on the water being carefully poured off. If a chronic inflammatory process have been lit up in the inner coat, the mucus degenerates still farther, and resembles purulent matter. If true inflammation have occurred, and the membrane have ulcerated, the bladder will contain more or less of true pus. And under such circumstances, the urine will generally be found dark-colored, turbid, alkaline, and fetid. The rectum sympathizes, more especially in children; the bowel becomes irritable; or hemorrhoids form; or prolapsus ani occurs. Frequently there is sympathetic uneasiness elsewhere; the testicles may be tender and retracted, from time to time; pain often shoots down the thighs; and unpleaeant heat is sometimes complained of in the soles of the feet.

The symptoms are not uniformly severe, but are liable to remissions and exacerbations; the latter, termed "fits of the stone," are attended with great agony—as the self-performed operations of the blacksmith of Amsterdam and the cooper of Königsburg abundantly testify.[1] These aggravations are induced by exercise, error in diet, or constitutional disorder; and the greater part of the suffering, it is probable, is directly dependent on spasm of the muscular coat of the bladder. The symptoms also vary according to peculiarity of constitution. One patient may suffer intensely, enjoying scarcely a moment's ease; while another complains but little, and follows his usual avocations, little disturbed; and yet the local circumstances may be very similar in both. And again, a variety in suffering is found to depend very much on the nature of the stone and the diathesis. The mulberry occasions more uneasiness than the smooth uric concretion; the rough and sharp nodules of the former coming into frequent and injurious contact with the lining membrane of the bladder. And the phosphatic stone will probably occasion more suffering than either; the general system being more deranged, as well as the mucous membrane; and both being consequently prone to resent the stone's stimulus; in other words, both the general and the local sensibility are morbidly increased. Also, with a varying diathesis, the intensity of the symptoms will vary. The uric concretion at first gives little trouble; but it becomes coated with oxalate of lime, and increase of pain may come with the formation of nodules; again the uric diathesis prevails, the rough eminences are levelled by the new deposit, the surface once more is smooth, or at least even, and a remission in the symptoms is experienced. But then the phosphatic diathesis ensues; both kidneys and bladder are advancing untowardly in disease; a layer is forming of the ammoniaco-magnesian phosphate, or of the fusible calculus: and the symptoms are more severe than they have yet been. For not only is the aggravation of the symptoms local; the constitution also suffers, and that seriously. [Figs. 222 and 223, given by Dr. Gross (Diseases and Injuries of the Urinary Organs, 2d Ed. p. 449), afford a striking illustration of the manner in which the irritation of the bladder may be aggravated by the shape of the stone which it contains. The first represents a calculus which was shown to Dr. Gross by Dr. Mussey, of Cincinnati; the second is from a drawing of another singularly rough one described by Sir Hans Sloane. Both specimens were removed from the bladder after death; they were supposed to be oxalate of lime in composition.]

Fig. 222.



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[1] Goaded on by torture to the desperate effort of ridding themselves from the stone by their own hands.

Fig. 223.

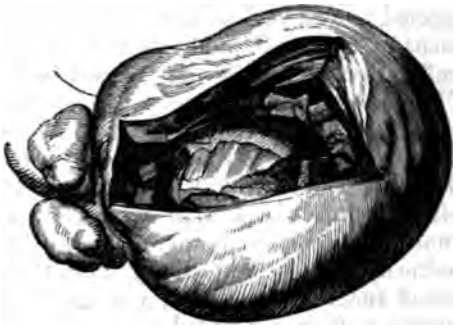
By supervention of enlargement of the prostate, the symptoms may be either mitigated or increased. If the gland simply increase in bulk, the former result may take place; the swelling coming to occupy the most sensitive part of the bladder, and consequently saving that from contact with the stone. But if the gland be ulcerated towards the bladder, and the stone rest in contact with the ulcerated surface, suffering will be greatly aggravated.

The most ordinary and diagnostic signs of stone are—frequent, sudden, irresistible, unrelieved desire to make water; pain at the point of the penis, after the bladder is empty; mucous urine, occasionally bloody; occasional stopping of the flow of urine, and restoration of the flow by change of posture. These fully warrant the surgeon in suspecting the existence of vesical calculus, and in adopting the necessary means to detect it; but of themselves, they never prove the existence of stone. The general symptoms of stone—and even these, the most pointed of them—may be very closely simulated by other affections; by organic disease of the kidney, by renal calculus, by irritation or organic disease in the rectum, by disease of the coats of the bladder, by prostatic affection, by stricture of the urethra. Certainty can never be arrived at without the use of the sound.

The continued irritation, by the stone's presence, induces serious change in the coats of the bladder. The mucous membrane, as already seen, becomes congested, and sustains perversion of its secretion; the mucus is at first viscid and clear, afterwards discolored and phosphatic. By a chronic inflammatory process the membrane may be thickened; by true inflammation it may ulcerate, discharging pus copiously. The muscular coat, under frequent stimulus to contract, and frequent obedience to that stimulus by violent and spasmodic contraction, becomes hypertrophied; after death, the fasciculi are seen coursing in their interlacements, salient and strong, with depressions between. The cavity of the viscus is contracted; and such diminution in capacity is usually proportioned to the increase of bulk in the muscular fibre. Between the fasciculi, the depressions get deeper and deeper; and frequently the mucous coat becomes protruded outwards, so as to form pouches or sacs, of greater or less size; within which a calculus may become embayed, or a fresh concretion may form. Abscess may occur between the coats; usually discharging itself into the viscus; sometimes opening outwards, by perforation, into the cavity of the peritoneum, or into the deep areolar tissue of the pelvis—either event most hazardous—or into the rectum. And thus, in three ways, a cavity may be produced for the encystment of calculus; by internal opening of a parietal abscess; by hernial protrusion of the mucous coat, outwards, through the muscular; by deepening and enlargement of a depression between the hypertrophied fasciculi. The inflammatory process may invade the whole coats; chronic or acute. Gangrene has sometimes occurred; ulceration and abscess are not unfrequent. In the aged, chronic cystitis is almost inevitable; then the phosphatic mucus, which attends this affection, increases the growth of the stone; and phosphatic deposit, becoming entangled in the viscid mucus which adheres to the lining membrane, may lay the foundation of other concretions, or constitute a broad adherent layer of calculous matter. The prostate sooner or later becomes enlarged, in those advanced in years. The kidneys suffer more and more by derangement of function; ultimately organic disease is not improbably produced. And under such advancement in disease and suffering, it need not surprise us that the issue of the malady is death. At the same time it is not to be forgotten, that many a patient, with large stone, bulky prostate, and diseased bladder, lives for years, and may die of an ailment with which the stone is unconnected.

The effects of time on the stone itself are important. The most obvious is enlargement; slow, in the case of the mulberry; in the uric, seldom rapid; in the phosphatic, rapid and untoward. And be it remembered, that whatever the nature of the original concretion be, its ultimate coatings will be phosphatic, if it remain long; its irritation never failing to induce the phosphatic depravity of secretion, in the kidney and in the mucous coat of the bladder. By sacculation of the bladder's walls, an opportunity is afforded for encystment. And if this take place, the symptoms are all mitigated—may indeed wholly disappear. But the stone slowly receives addition within the pouch; and probably will come to project through the aperture of communication. On such projecting portion, deposit takes place with greater rapidity; and then we may expect the symptoms of stone to be revived more or less intensely. Occasionally, the stone undergoes spontaneous disruption; sometimes after unusual violence of exercise, sometimes in connection with no assignable cause. In such cases, the stone is usually phosphatic; the particles being more loosely aggregated than in the uric or mulberry concretions. The event is generally to be regarded as untoward, when the stone is of any considerable size.[1] Indeed, unless speedy relief be afforded by our art, the issue is almost certainly fatal.

Fig. 224.



Bladder containing a calculus in fragments. Spontaneously disrupted. Termination fatal; by inflammation.—Liston, Elements, p. 633.

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[1] A small stone, spontaneously disintegrated, may be expelled by the urethra without much suffering, and with no danger.

sharp irregular fragments inflict great injury on the urinary organs;
e may obstruct the urethra, causing retention of urine, with its
ious calamitous results; the rest excite cystitis, acute and intense;
bladder becomes filled with coagulated blood, and from this cause a
nidable retention of urine may result; the kidneys sympathize; and,
er a complication of disorders, the system is apt to be overborne.
ely, a case occurred under my observation, in which the immediate
ils of retention by coagula in the bladder were got over, as also the
t brunt of the cystitis; but at the end of the third week, the patient
ished by abdominal peritonitis, found to result from extravasation of
ie through perforating ulcer of the bladder.

n a few very rare cases, ulceration of the coats of the bladder has
the happy effect of permitting spontaneous extrusion of the stone;
ugh the abdominal parietes, in the hypogastric region; into the
um; or into the vagina. But such a result, so rare, hazardous, and
robable, manifestly cannot be taken into account in consideration of
inary treatment.

Treatment of Stone in the Bladder.

o treatment can be adopted with propriety, until an absolute assur-
e has been obtained of the existence of stone. And this can only be
red, as already stated, by *Sounding;* a simple operation, yet one
iring tact and care in its performance. The introduction of an
rument by the urethra, and its movement in the bladder during per-
ition, must always be attended with more or less suffering—unless
sthesia by chloroform be employed; and there must always be a
ter or less risk of undue excitement following. It can readily be
erstood how the careless and rude use of a sound in an irritable
lder and patient—had recourse to after walking, or travelling in any
, and not protected by rest and suitable treatment afterwards—may
ice a most serious cystitis, with implication of the kidney; and it is
tary to remember that a cystitis thus caused has once and again
ed fatal. A patient—say from the country and just arrived—pre-
ing himself with the ordinary symptoms of stone, is not at once to
ounded, and at once dismissed. We should first ascertain that pulse,
ey, and bladder are sufficiently quiet to admit of this operation
g practised with impunity; and, after its performance, rest should
ainly be enjoined for some time, perhaps with sedative, or even
iphlogistic treatment. It is in itself an important operation, and
ald be regarded as such. In children, and in irritable adults, it is
l to use chloroform, as formerly stated.

he instrument is of steel, of medium size, straight till within two
ies of the extremity—where it is sharply curved—and furnished with
oad and smooth steel handle. Of steel, and broad in the handle, so
its impingement on the calculus may be the more distinctly felt;
of a sharp, short curve at its end, so that the straight portion being
he urethra, while the whole of the curve is within the bladder, the
may be moved about in that viscus freely, and in all directions; of
lium size—not so large as to be grasped tightly by the urethra, and

to be limited in its movements—and yet large enough to afford a steady grasp to the operator, with surface enough for readily striking the stone. The bladder should be as much distended by retained urine as the patient can conveniently bear; so as to afford room for the instrument's play. The patient is placed recumbent; and, the sound having been gently introduced, the convexity of its curve is pressed in the direction of the ordinary site of stone—at the most dependent part of the bladder, behind the prostate. There, a hard substance being felt, the instrument is moved sharply, with a gentle striking movement; and in addition to the rub which was at first conveyed to the operator's hand, a distinct click will be heard, while a more defined and vivid impression of impingement on a foreign body will be felt. And without this combined indication of touch and hearing, the surgeon should never be satisfied of the existence of stone. If nothing be found in the ordinary site, the instrument's point must then be moved carefully and inquiringly in every direction; groping at first as a probe; and, on finding resistance, moved with a sharp yet gentle stroke. Of four sources of fallacy we must be constantly on our guard: the rub of the end of the sound on fasciculi of the bladder;[1] the grating of it on calculous matter entangled in the mucous lining; the rub of a rough and entangled prostate; and the rub and grating of calculous matter in the prostatic or membranous portions of the urethra. If nothing is found in the ordinary site and in the ordinary way, posture is changed, and the search renewed; first in the erect posture, and then with the patient stooping much forward. The space above the pubes, in the latter position, is particularly explored. The stethoscope may possibly be of service, applied over the region of the bladder; but it is difficult to repress the thought, that wherever a stone actually is, the signs emitted by the sound's use will be sufficiently distinct, without the aid of mediate auscultation. Change of posture having failed to detect stone, change in the state of the bladder may next be tried. The urine may be allowed to dribble away by the side of the sound; and as the bladder contracts, the sound is moved gently in various directions, so as to favor distinctness in the sensation of contact should the stone descend upon it. Or a catheter, shaped like the sound, may be substituted; and, during rapid contraction of the bladder, contact may be ascertained. After failure by all the ordinary means, success has followed the use of an elastic catheter in this way: With the bladder full, the patient, erect, makes water in a full stream through the instrument; and, as the last drops escape, the stone falls on the point of the catheter and is felt.

Fig. [illegible]

Sounding. The stone in its ordinary position.

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[1] In using the catheter for retention of urine in the aged, a fasciculated portion of the thickened bladder sometimes comes suddenly in contact with the end of the instrument, interrupting the urine's flow, and giving the sensation of stroke or rub to the operator's hand. This, to the unwary, may simulate the presence of stone; and has to be guarded against accordingly.—*Vide* Adams on Diseases of the Prostate, pp. 76, 77.

Whenever difficulty is experienced in detecting a stone, in a case of plain symptoms, it is better to repeat gentle exploration at intervals, than by one continuous and prolonged perquisition to endanger the occurrence of cystitis and sympathy of the kidney—perhaps peritonitis by extension, and death. In children, the prudent surgeon is not satisfied with any obscurity; the click and rub must both be very distinct; the restlessness and crying of the patient being otherwise apt to lead to deception. It is chiefly in such cases that blank lithotomy has been performed. And to guard against this, it is in such cases that the use of chloroform is especially serviceable.

But, by the sound's use, we may ascertain some of the characters of the stone, as well as its existence. Moving the point over the stone's surface, we may be able to estimate the smoothness or roughness of it. Passing it over, and on all sides of the stone, we may obtain some idea of its form and bulk; and, by the finger of the other hand in the rectum, we may sometimes be greatly assisted in this conclusion, by feeling its weight, as it were, while at the same time its diameter, at least in one direction, is made apparent.[1] Moving the sound in the bladder, we may have a distinct sensation of one stone being left, while another is encountered by the instrument; or plurality of stones may be indicated by another circumstance, the stroke of the instrument eliciting different sounds at different parts of the bladder—the sounds differing as to clearness, and as to pitch or tone. Also, a large stone is at once detected; a small one may long elude the sound. And again, while the rub and grating imparted by a large stone are most distinct, the click of a small stone is more clear and defined; and the following practical inference may be almost arrived at—the smaller the stone the sharper and more distinct the click; the larger the stone the more palpable the feel. Further, when the symptoms have been of long duration, we may expect a large stone; and *vice versa.* Also, phosphatic formations are apt to be larger than those of any other kind.

Having, by sounding, ascertained the existence of Vesical Calculus, the treatment of it naturally resolves itself into the following indications:—

I. *Assist Nature's effort to expel the offending body.*—This, obviously, is applicable only to calculi of small size; those, for example, which have recently descended from the kidney. Their natural progress is outward, with the current of urine. And in females this is usually effected readily; the urethra being short, straight, capacious, with its current impetuous; and hence one reason why vesical calculus in the female is rare. In males, however, there are many obstacles. The urethra is both long and tortuous, it is comparatively narrow besides, and its current is proportionally defective in expulsive force; spasm, too, is liable to interfere. And yet, judiciously assisting Nature, small stones may be thus got rid of; by dilatation of the urethra, diluents, and forcible voidance of the urine. By the occasional introduction of bougies the urethra is brought to more than the normal dimensions, while its irritability is also diminished;[2] and by the use of diluents the flow of bland urine is considerably increased. It is well, also, to accustom the bladder to considerable distension by its contents. Then, with the bladder full, and the urethra occupied by a full-sized bougie, the patient stands stooping; and, the bougie having been suddenly withdrawn, evacuation is made in as full and forcible a stream as possible. In the case of enlarged prostate, the main obstacle to the escape of a small stone by the urethra is at the lower or posterior part of the outlet; it is well, therefore, under such circumstances, that the patient expel his urine in a recumbent and prostrate posture.

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[1] It is right to remember, however, that, in the adult, the stone may not be felt by the finger in the bowel.

[2] It has been proposed to introduce belladonna into the rectum, so that the neck of the bladder may be relaxed and dilated—like the iris.

The only objection to this mode of treatment, is the risk of arrest in the urethra, inducing retention of urine with its many dangers.

II. *Attempt Disintegration medicinally.*—Attempts at expulsion having failed, or being deemed inadvisable, the following other modes of removal may be thought of: solution within the bladder, forcible abduction by the urethra, disintegration by mechanical means, excision. The first of these indications may be attempted in two ways: by medicines given by the mouth; and by injections into the bladder. Of the former class of remedies, the alkalies are the most prominent; especially the carbonates of soda and potass, given in small doses very copiously diluted—imitations of the natural waters of Vichy, of repute in calculous disorders. The oxalate of lime calculus resists their influence. But the uric formations may be benefited in two ways; alkalies thus given tend to correct the diathesis whereby the calculus has arisen, and at the same time have undoubtedly a sedative and corrective effect on the urinary organs—improving the secretion of the kidneys, and assuaging the irritability and disorder of the mucous coat of the bladder. They arrest growth, and palliate the symptoms of stone; and experience would seem to say, that a slow and uncertain diminution of the stone occurs during their sustained use. Further, the voice of experience certainly conveys the fact, that their continued use—provided it be in small doses, greatly diluted—has no injurious consequences either on the renal secretion or on the general health.

In the case of phosphatic formations, large doses of alkalies must prove prejudicial; but doses such as already mentioned fail to do harm, and at the same time seem to have the effect of favoring gradual disintegration of the stone, by solution of the animal matter whereby the calculous particles cohere.

Further experience in the use of these simple lithontriptics is much to be desired. But it is to be feared that the long-continued use which is essential, and the uncertainty of the issue, will prevent any general employment of, or confidence in them. No doubt, however, they are of much value, in a subsidiary place; as a means of delaying the increase of uric formations; favoring disintegration of phosphatic calculi—as a prelude to Lithotripsy, for example; in all cases of stone, improving the state of the urine and of the lining membrane of the bladder, and so mitigating the distressing train of symptoms.[1]

Solvent injections into the bladder have been in use since 1792; with various degrees of expectation. As yet, unfortunately, their success is far from great; and we dare only place them in the same subsidiary rank as internal lithontriptics. The agents employed have naturally been alkalies and acids; the one in uric formations, the other in phosphatic; introduced by means of a syringe operating on a double canula, whereby a constant stream may be kept in play on the calculus within the bladder. The objections are the same as before; delay in treatment, and uncertainty in effect. The acid injections, however, may be not without their efficacy, as palliatives of the symptoms attendant on phosphatic calculus; employed weak, as correctives; not strong, as solvents. Of late, the carbonate of lithia has been supposed a promising solvent for uric concretions; and the salts of lead have been proposed, as suitable for injection in the case of the phosphatic.

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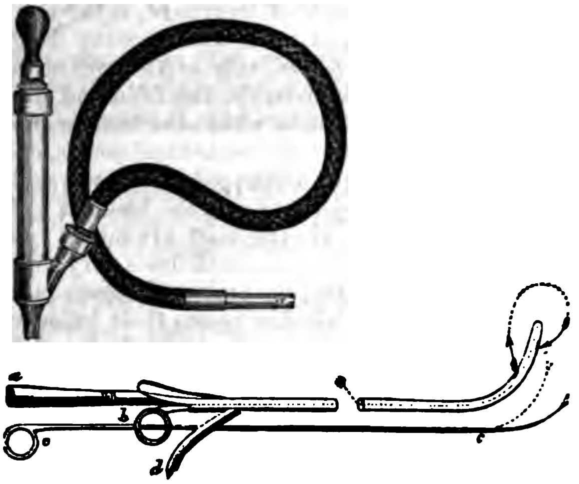
[1] At all times, however, even the most cautiously sustained use of alkalies must be watched, lest serious injury accrue to the system by its over-saturation with them.—*Vide* Lancet, No. 1177, p. 318.

Fig. 226.

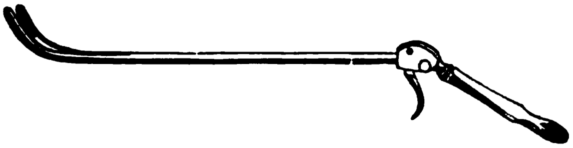


[Double Canula, with a Read's Syringe, for injecting the bladder. The middle figure represents the canula, or catheter, divided into two tubes, as marked by the dotted line, and also the star. The nozzle of the syringe is received at *a*; the fluid is forced along the tube, escapes *into* the bladder by the aperture marked by one arrow; *from* the bladder it is withdrawn by the syringe through the aperture marked by the other arrow, and escapes from the tube at *d*. If the orifices become clogged at any time, they can be reopened by means of the flexible and elastic stylet, *cc*, which is so large as nearly to fill the tube, and which may be introduced either at *a* or *b*, the latter orifice being represented in the drawing as closed by a plug. (From Fergusson.)]

III. A method of *Snaring* has sometimes proved successful, in the case of small calculi. It having been observed that, in removing catheters used on account of retention, small calculi were occasionally found entangled in their eyelets, or lodged in the tube—it was thought that in cases of calculus, this, when small, might so be ensnared and withdrawn. M. Bourguenod was the first to adopt the practice; and he met with a few imitators. But success depends evidently too much on chance, and that chance is too remote, to admit of the procedure being favorably entertained by the practical surgeon.

IV. *Forcible Evulsion* may be attempted, by the urethra. By the forceps of Cooper, for example, a small stone may be seized and withdrawn. But all such proceedings have been justly superseded by Lithotripsy. The perquisition was painful and tedious; in seizing the stone, the lining membrane of the bladder was liable to receive injury; and, after seizure, it was not improbable that the attempt at extraction might prove abortive—the stone perhaps becoming impacted in the urethra, and locked at the same time most inconveniently in the jaws of the instrument.

Fig. 227.



[Sir A. Cooper's Instrument, improved by Mr. Weiss. At the point it consists of two blades hollowed within, which can be made to open by means of a stylet, connected with a trigger near the handle. When in the bladder, the blades are made to open by pressing upon the trigger, and they close again by their own elasticity. Thus, by opening and closing the blades, and moving the instrument, small concretions may be caught. (From Fergusson.)]

V. *The Calculus may be disintegrated by Instruments.*—In fulfilment of this indication there are two methods—Lithotrity, and Lithotripsy; the latter the more modern, and preferable.

Lithotrity signifies a boring or rubbing of the calculus, in the hope of its becoming pulverized. This was first put in practice—at all events in modern times[1]—in 1800, by General Martin; who operated on himself, with partial success, by means of a file. In 1813, Gruithuisen proposed the use of a canula, through which, by means of a wire, the calculus was to be noosed, and then attacked by a borer. In 1819, Elderton invented a more feasible instrument. But neither of these were used in practice. In the same year, Dr. Arnott did good service, in illustrating the capabilities of the urethra and bladder, for the reception and play of suitable apparatus. In 1822, Amussat and Le Roy busied themselves in this department; the latter most ingeniously. And in 1823, M. Civiale, availing himself of the labors of his predecessors, invented a three-branched boring apparatus, well adapted for drilling stones when caught—equally apt, however, to seize the coats of the bladder, and not very well adapted for disposing of the stone effectually. Its success in practice proved but indifferent. And, now, all such implements have been superseded by the crushing apparatus—more simple, safe, and effectual—whose use constitutes Lithotripsy.

Lithotripsy.

To remove calculus by crushing is a more modern idea than that of boring or drilling. Various instruments have been proposed and used; some with screws, some with hammers. At present the voice of the profession apparently prefers the former; on the principle of the instrument originally invented by Mr. Weiss in 1824; composed of two blades, abruptly curved at the extremity—the one sliding on the other, and propelled by means of a screw.

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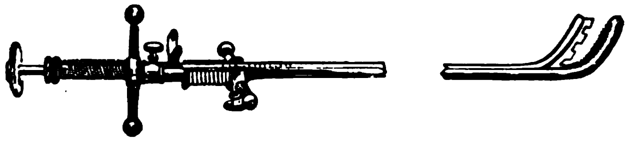
[1] Albucasis and Sanctorius had notions of bruising stones, and invented instruments for the purpose.

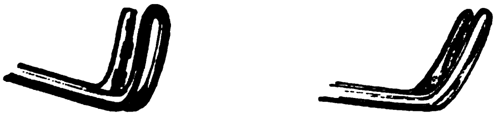
[Several drawings from Mr. Fergusson's last edition, exhibiting the most approved forms of instruments employed in Lithotripsy have here been introduced in previous American editions by Dr. Sargent.

Fig. 228.



[Large Screw Lithontriptor of Mr. Weiss.]

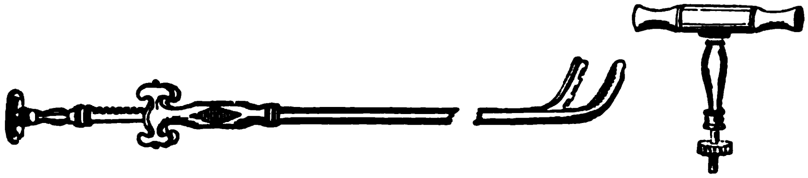
Fig. 229.



[Plan of the Extremity of the Blades.]

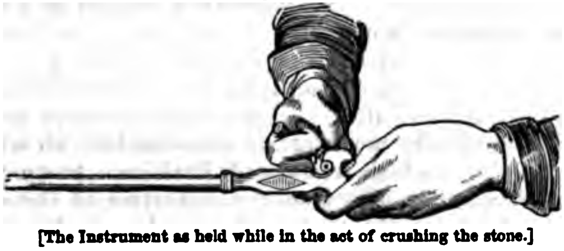
Fig. 228 exhibits a screw instrument of Mr. Weiss, large and strong, for crushing large and dense concretions; the male blade being serrated, and the female fenestrated, for the purpose of breaking the stone, and forcing the fragments from the jaws of the instrument into the bladder again, so that when the former is withdrawn, the lining membrane of the latter and of the urethra shall not be injured.

Fig. 230.



[Mr. Fergusson's Instrument, the male blade being moved by the key.]

Fig. 231.

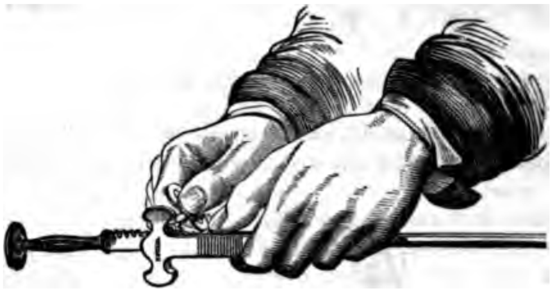


[The Instrument as held while in the act of crushing the stone.]

Fig. 230 represents an instrument of Mr. Fergusson, in which the ordinary screw is modified, so that a key is used to move the male blade.

This lithontriptor is introduced into the bladder in the ordinary manner; the stone is caught, and, after the surgeon has assured himself that the mucous membrane is not included in the grasp of the instrument, the key is applied and used as shown in Fig. 231, or as in Fig. 232. Mr. Fergusson prefers to stand on the patient's left, and holds the instrument as in the last figure.

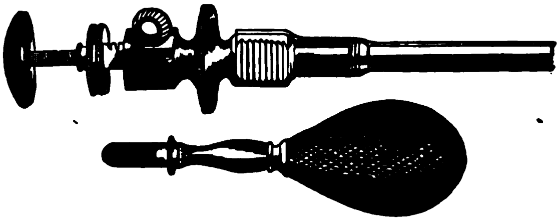
Fig. 232.



[The Instrument as held while in the act of crushing the stone.]

Mr. Fergusson mentions a recent Parisian improvement upon this instrument, which was exposed at the Great Exhibition. (Fig. 233.)

Fig. 233.



[The French Instrument here noticed. (From Fergusson.)]

"The rack consisted in a series of circles, and the part for the reception of the pinion or handle could be made to revolve in such a way, that the handle could be applied with perfect ease, in whatever position the instrument might lie." (Fergusson's Pract. Surg. Philad. 1853.) Mr. Fergusson prefers his own instrument, however, as being more simple, and because the movement of the blades is better.]

A stone having resisted all endeavors towards its spontaneous expulsion by the urethra—and after, perhaps, a vain attempt has been made towards disintegration by medicinal means—has but two ways of being efficiently dealt with—Lithotripsy and Excision. Some years ago, a hot controversy was waged between the supporters of these operations; each party maintaining their adopted procedure to be the best, and applicable to all cases of stone in the bladder; one party attempting to grind or crush every stone that presented itself, the other using the knife indiscriminately. Fortunately, a better state of things now exists.

ell-educated surgeon, finding himself equally well qualified to per- either operation, is in a position to consider, calmly and impar- the bearings of each case that comes under his care. Some he suitable for Lithotripsy, others not; and so some stones he attempts sh, and others he at once sets aside for excision. And therein he rell. The one operation does not, and cannot, wholly supersede her; and yet there is every reason to believe that often the crush- eration is by much to be preferred; not less formidable in all cases ne; but certainly less formidable in those whose circumstances we nize as adapted to its use. The indiscriminate employment of the tion, however, has been fully established as somewhat more fatal he indiscriminate performance of Lithotomy.

cases favorable to Lithotripsy are of the following character: rethra must be free from stricture; the prostate must not be large; ladder must be not much diminished in capacity, comparatively rom irritability and not sacculated; the kidneys must be organi- sound. Otherwise, the instruments will not have room for safe fficient play; the risk of cystitis will be great; aggravation of disease will be certain; and fragments, being received into sacculi, e placed temporarily beyond the reach of treatment, and will en- into fresh calculi. The stone itself must be of no great size, and great toughness. The mulberry calculus is usually dense and firm h to resist all the pressure which may be exerted safely; stones of size—say of uric formation—are obviously not amenable to the of the instrument; and, even if they were, the number of rough ents, and the many seizures which would be required for their rization, would obviously tend to serious mischief in the bladder. er, it were well that no great amount of viscid mucus were secreted the bladder; for this, entangling part of the *debris*, is likely to more than one nucleus for the reproduction of stone. Such are ses favorable for Lithotripsy; when the urethra and kidneys are ically sound, and the bladder and prostate are but little altered; one small and soft; the system not irritable. At one time it was sed that the operation should be limited to adults; the parts of the being too limited for free and safe use of the instruments. Expe- has proved, however, that such objection does not hold good; hat with suitable instruments, carefully and skilfully used Litho- r is quite as applicable to the adolescent as to the adult.

en in the favorable cases, Lithotripsy is not without its risks and vantages. In the hands of the most expert, the stone is not always ly and at once caught; and perquisition may consequently be tedious urtful. The fragments must irritate the bladder more or less; ling at least some of the hazard which attends on spontaneous dis- n. Fragments passing by the urethra create much irritation there, ay induce serious inflammatory disease, extending to the bladder; ragment may be arrested in its outward passage, and cause perilous tion of urine. Small portions may remain behind, eluding the l, and becoming sure nuclei for reproduction—loose in the bladder, gled in adherent mucus, embraced by a fold of membrane, or yed in a sacculated cavity. One operation is seldom sufficient;

repetition is necessary, perhaps once and again; and, under this, serious constitutional disorder may arise, prominently connected with renal disease. It has been well remarked by Dr. Willis, that even the successful cases may present the following degenerate class of symptoms. Although the stone is gone, "the man is not quite well; irritability of bladder to a greater or less degree remains behind; this irritability increases; the constant services of the medical attendant again become necessary. The patient is next tormented with ceaseless pain in the region of the bladder, which by and by extends up the loins, and settles in the back. The urine has never been healthy in its character, or it has altered at an early period of these untoward symptoms; by and by it becomes like turbid whey; it has a faint, sickly smell; it coagulates on the addition of nitric acid and when exposed to heat; the patient loses flesh and strength; his stomach fails him; he becomes sick and vomits; he begins to doze; and then he falls into a state of coma from which he never awakes; or he is seized with convulsions in which he expires."[1]

Such, then, we hold to be the true position of lithotripsy; applicable to certain cases of stone; for these less hazardous than lithotomy, and therefore to be preferred; always, however, liable to the objections of long time—comparatively—consumed in treatment, risk by repetition of the operation, and the danger of exciting or aggravating renal disease.

When a favorable case presents itself, the operation is not at once performed; a certain period of preparation is essential. The general functions must be placed in a healthy state; tongue clean, pulse natural, bowels open, skin acting well, &c.; all phlogistic tendency must be overcome, by a certain amount of antiphlogistic regimen; the urethra—if need be—must be dilated, and deprived of morbid irritability, by the occasional use of a bougie; the bladder, too, must be accustomed to tolerable distension. A weak solution of the bicarbonate of potass or soda may also be given; with the double view of amending the secretion of urine, and assuaging both renal and vesical irritability—especially the latter—at the same time favoring disintegration, by loosening cohesion of the calculous particles.

Circumstances being deemed favorable, the patient is placed recumbent, on a convenient table, bed, or couch; with the pelvis elevated on a cushion, so as to throw the stone into the fundus of the bladder, away from the neck; and with the bladder as full of urine as possible, in order to admit of seizure, retention, and crushing of the stone taking place within the cavity, at a safe distance from the coats. And if there be any doubt as to the quantity of urine retained for this purpose, let a sufficiency of tepid water be slowly injected by means of a syringe and catheter. Then the lithontriptor, having been introduced—with its curved portion of the fixed blade hollow, so as to prevent inconvenient impaction of fragments—is used first as a sound; and the stone is usually struck where it is to be expected, at the then most dependent part of the viscus. On the mucous coat of the bladder at this point, the convexity of the instrument is made to press, while at the same time the thumb of the right hand moves the sliding blade backwards; then a slight wriggling movement is made with the wrist; and the stone, tumbling into the depression made by the downward pressure of the instrument, is felt between its jaws and secured. The direction of the lithontriptor—now holding the stone firmly—is then changed, so as to bring the stone into the supposed centre of the viscus; away from the mucous coats, and with urine all around. Then the screw is applied, and the work of crushing proceeded with. But if there be any doubt as to the instrument being free of the lining membrane, it must, in the first instance, be moved from side to side, or turned round, so as to make sure of this essential point. A small friable stone may be pulverized at one seizure. Usually, fragments are made; which in their turn require separate seizure and crushing. And for this latter work, a form of lithontriptor is preferable, whose fixed blade is not hollow at the curve; there is now less chance of clogging such an instrument, and when imperforate, it is more efficient in dealing with small fragments, which might in a great measure elude the force of the weapon first used. Enough having been done—and to estimate this, we must consider not only the amount of crushing, but also the patient's tolerance of the proceedings—a full-sized catheter is introduced, shaped like the lithontriptor; on opening its jaws, urine, with the finer of the detritus, freely escapes; and this extrusion—harmless and painless, because passing through the metallic instrument—may be favored by once and again injecting the bladder with tepid water, by means of a syringe fitted to the catheter; but only provided the feelings of the patient admit of this. The patient is put to bed; absolute rest in enjoined; opiates are freely administered, by both mouth and rectum, if need be; diluents are given; and antiphlogistic regimen is enjoined. Should excitement threaten, local loss of blood and hip-baths may be required. During some days, fragments and sand continue to pass, with more or less suffering; and, by and by, again the urine becomes clear and free. The bladder and system recover from their disorder; a tolerance of the operation is again established; and repetition may consequently be proceeded with, with all due caution. When, after one or more sittings, we have reason to suppose that the

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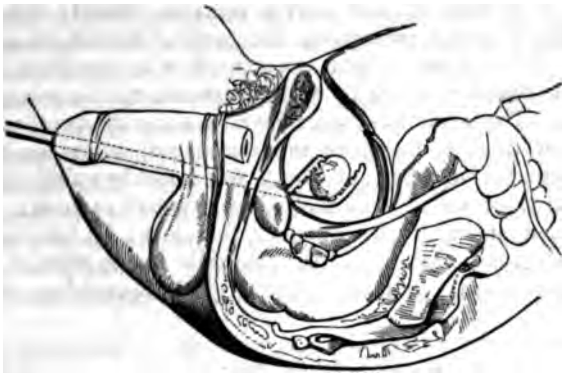
[1] Willis on Stone, p. 108.

Fig. 234.



Plan of lithotripsy. The stone caught, and the instrument in a suitable position for crushing.

stone has been completely crushed and passed, careful perquisition is to be made with the ordinary sound, used carefully, while urine is escaping from the recumbent patient; and repeating this search after injection of the bladder with tepid water. Should such careful searching fail to detect any lurking fragment, the patient may be relieved from treatment; much care being expedient for some considerable time, however, lest either renal or vesical disorder—especially the former—ensue.

It is a question whether chloroform should be used or not in this operation; the objection being that the patient's feelings are useful to determine whether or not injury to the bladder's coats is avoided, and that in deep stupor the urine is apt to dribble away involuntarily, perhaps emptying the bladder ere the operation is well begun. The former evil—the more serious—may be escaped by care and skill in handling the instruments, the latter by pressure of the fingers, or the use of a jugum penis. The advantages of anæsthesia are evident; especially in relaxing all spasm, as well as voluntary effort, which might impede manipulation.

Lithotomy.

This operation is very suitable to children. It is preferable to lithotripsy in adults when the stone is large, and when it consists of the oxalate of lime; also when the bladder is intolerant of perquisition and distension. There are various modes of performance: the lateral and bilateral; the high operation, or supra-pubal; the recto-vesical. For ordinary cases, the lateral is much to be preferred.

As early as the year 318 B. C., the ancients cut out stones, by incising the perineum freely, the stone having been made prominent there by fingers introduced within the rectum; and this operation—"cutting on the gripe" continued in use till the sixteenth century. In 1525, Johannes de Romanis, of Cremona, incised the bulb on a sound, prolonging the wound into the membranous portion of the urethra; the neck of the bladder he then dilated by male and female conductors, until the wound was deemed sufficiently wide for the introduction of forceps and removal of the stone. This operation—termed, from its complexity, the method by the "apparatus major," or the Marian method, from the name of an especially eloquent advocate of its superiority to all others—continued in vogue until 1697; productive, however, of only indifferent success. In that year, Frère Jacques appeared; the advocate of incision, as preferable to laceration; at first cutting recklessly and ignorantly into the perineum, by an instrument very like a dagger; afterwards operating with a common scalpel, and incising the prostate and neck of the bladder with scientific precision—having specially studied anatomy under Duverney at Versailles. This was the foundation of the lateral method; afterwards practised with much success by Raw in Holland, and subsequently by Cheselden in this country—but not successfully by the latter surgeon, until he had recovered from mistakes into which he had been led, by the disreputably mysterious use which Raw had made of the knowledge which he obtained from the honest Friar.

We shall describe the lateral operation as ordinarily performed by modern surgeons; and more especially as we were taught it by the late Mr. Liston. From his high authority, in one point only would we venture to dissent. He was opposed to much preparation of the patient; conceiving that delayed expectation of the event operates injuriously on the mind, and disposes to sinking, or at least to asthenic results. On the contrary, we think preparation quite as essential here as in the case of lithotripsy. We hold that it is necessary to subdue phlogistic tendency, to rectify general function, to quiet the bladder and system, and to amend the state of the urine—before the operation can be performed under auspicious circumstances; and that such preparation ought invariably to be completed, whether the time occupied be of weeks or days. Among other items of management, the carbonates of soda or potash, in weak solution, not only may be expected to produce the good effects on the bladder formerly mentioned; but besides, the urine, by their use becomes less acrid than usual, will prove less hazardous in the event of infiltration in the wound.[1]

The patient is placed on a firm table, of convenient height; and is bound securely, hand to foot, by stout tapes. In no operation is anæsthesia by chloroform more suitable or safe. It is well to clear the lower bowel, the evening before, by an enema, or by castor oil; and the bladder should be moderately full of urine. A staff is passed, of as large a size as the urethra will conveniently bear; grooved deeply on the convexity, a little to the left side.[2] It will be more readily introduced before than after deligation; and the surgeon should be satisfied, before he proceeds a step further, that it impinges on a stone. If in doubt on this point, let him withdraw the staff, and introduce a sound. It is essential that the stone be felt immediately before the operation. Deligation over, and the staff satisfactorily passed, the patient's nates are brought to project a short distance over the end of the table; and there he is to be secured by assistants; one placed behind, with a hand on each shoulder, ready to oppose any involuntary movement away from the operator; and one to each limb, holding them apart, and pressing each femur firmly down into the acetabulum, so as to fix the pelvis and at the same time fully expose the perineum. To the principal assistant, the staff is intrusted; to be held very steady, in a vertical position, and hooked up against the pubes—as much space as possible being thus made between the membranous portion of the urethra and the rectum; and the same assistant keeps the scrotum elevated. The surgeon, seated in front, at such a height as to bring his hand conveniently on a level with the perineum—and with all the instruments he is likely to require spread on a towel or tray on the floor by his side, so as to be within easy reach when wanted—introduces his left forefinger into the rectum, to make sure of its being empty, and to stimulate it to contraction. The knife—longer than the common scalpel, especially in the handle, and with the posterior two-thirds of the edge blunt—is then entered in the perineum—previously well shaved—about an inch in front of the anus, on the left side; and is carried downwards beyond the anus, passing about midway between that orifice and the tuberosity of the ischium, through the skin, fat, and superficial fascia. The forefinger of the left hand is then placed in the wound, and directed upwards and onwards; with the double object of keeping the bowel out of harm's way, and dilating the space—pushing aside areolar tissue, but not tearing muscular fibre. With the knife's edge, the fibres of the transverse muscle of the perineum—if it exist—are divided, along with such fibres of the levator of the anus as resist the free onward passage of the finger. The groove of the staff is now sought for; and the finger is moved freely, so as to dilate the outward wound sufficiently—a touch of the knife's point being applied, warily, to any resisting part. Behind the triangular ligament, and in front of the prostate, the finger-nail is lodged in the groove; and over it the knife's point is made to perforate. The knife, felt distinctly on the staff, is then pushed onwards in the groove, obliquely downwards and backwards; so as to divide the portion of the urethra which intervenes between the point of the knife's entrance and the prostate gland, and also the anterior part of the prostatic portion of the urethra. In other words, space enough is made for introduction of the finger, which follows the knife; and the base of the prostate gland in its outer part is left intact. The finger, introduced and moved freely, increases the space considerably. And this dilatation of the wound is preferable to extensive incision; there being much risk in cutting through the reflection of the ileo-vesical fascia, which is situate at the base of the outer aspect of the prostate, and which serves as an important boundary between the deep and superficial areolar tissue. By leaving this entire, the principal danger by urinary infiltration is shunned. And by dilatation of such a limited wound as now described, ample space is afforded for the introduction and play of forceps, and for the extraction of ordinary calculi.[1]"

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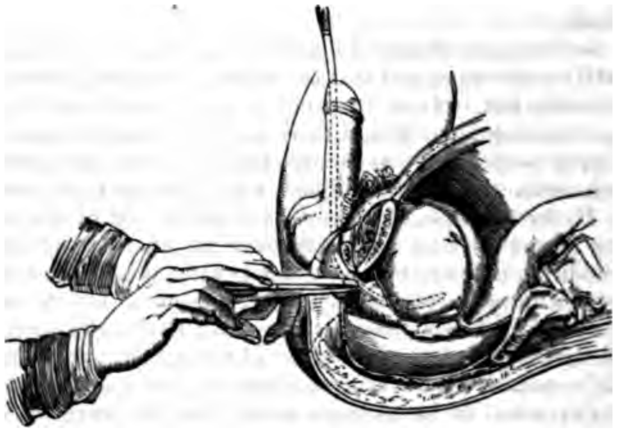
[1] An American surgeon, of great repute as a lithotomist, attributes his success not to any peculiarity in the mode of operating, but solely to his long-continued and careful preparation of the patient.

[2] The late Mr. Key used a straight staff—(Treatise on Section of the Prostate in Lithotomy. London, 1824) Dr. A. Buchanan uses and recommends a rectangular staff—(Monthly Journal, Feb. 1848, p. 554).

Fig. 235.



Plan of the Lateral Operation of Lithotomy. The knife entering the urethra.—Fergusson.

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[1] Too sparing a wound of the prostate is also to be avoided; otherwise sufficient space

Large stones require particular expedients, to be afterwards explained. In fact, the rule in this lateral operation is, to have a free external wound, and a small internal one; the latter, when dilated, extending from the point of puncture in the membranous portion of the urethra, to the base of the prostate; the former varying in extent according to circumstances; always large and free, and largest when either a deep perineum or a bulky stone is expected to be encountered; for, the yielding of the surface both gives room and diminishes depth, in the work of extraction, as well as in the formation of the deep wound. In withdrawing the knife, some little care is necessary, lest the edges should inadvertently come too near the ramus of the ischium, and endanger the pudic artery.

The making of the deep wound requires deliberation and care; and it is expedient that the points of the finger and of the knife should move together, in order to secure exactness. In athletic adults, naturally of a deep perineum, and who are not in a state of anæsthesia, difficulty may be experienced at this stage by straining of the muscles, whereby the bladder is elevated in the pelvis, and the parts consequently removed from the control of the finger. Under such circumstances, it were rash to proceed with the knife alone. The operator must withdraw the knife; and, keeping his finger in the deep wound, he should wait patiently until the straining or spasm has ceased; establishing the full influence of the chloroform; or reasoning with the patient on the propriety of his being as passive as possible—if he be not anæsthetized; and resuming the operation, when the parts to be cut are again found to be within his finger's reach.

While the forefinger dilates the deep wound, the urine escapes more or less rapidly; and we expect that the stone, descending in consequence, will be distinctly felt. Then the staff is gently withdrawn; by means of the finger moving in contact, a more precise idea of the nature of the stone or stones is obtained—as to size, number, shape, and position; and to the circumstances thus ascertained, the subsequent proceedings are adapted. If, for example, the stone be found of larger size than what the surgeon knows will pass readily through the aperture he has already made, an addition of space may be gained, without tearing, and without the division of any parts which it is expedient to retain entire—by passing a straight probe-pointed bistoury over the forefinger retained in the wound, dividing the prostatic region of the urethra on the right side, to the same extent as on the left, and then renewing dilatation. When the stone is expected to be of considerable size, the surgeon should be prepared to adopt this bilateral incision from the first.

The wound being deemed sufficient, and the finger being in contact with a stone of ordinary character, forceps are introduced, for seizure and extraction. These should be, in length of handle and capacity of blades, proportioned to the size of the stone; the object being, that the blades shall embrace the calculus at as many points as possible, and that the handles shall be long enough to give a full power in extraction.

can be obtained only by tearing. A dense unyielding structure, demonstrated by Liston and others, at the posterior part of the gland must be divided, in order to admit of easy dilatation. *Vide* Liston's Pract. Surgery, last edition, p. 510; also Lancet, No. 1132, p. 515, May 10, 1845.

The blades are partly lined with calico, so as to diminish the chance of the stone slipping from their grasp. An instrument, suited to the stone, having been selected, is passed over the finger to the deep wound; and, as the finger recedes from this, the forceps enter and come in contact with the stone. If this be not at once felt, the handles should be elevated, so as to depress the blades to the part of the bladder where the stone is most likely to be. The blades are opened, and, by a catching movement of the instrument, seizure is effected. If any suspicion exist that a portion of the bladder may have been included along with the stone, the instrument is turned round so as to test this; freedom of movement implying freedom of the bladder. Seizure having been accomplished, the axis of the forceps is changed; the point is raised, and the handles are depressed. The forefinger is then re-introduced by the side of the instrument, and between the blades, to ascertain in what direction the stone is placed, and to rectify the position if necessary. For example, if an oval uric calculus have been seized in the transverse direction, it will not pass through the deep wound without much violence, if at all. The jaws of the instrument are slightly relaxed; and with the forefinger's point the stone is gradually and carefully shifted, until the long diameter presents to the wound. Then the extracting force is applied; pressing the handles to each other as much as is necessary to prevent slipping of the stone, and not so much as to endanger its being broken; directing the handles, and consequently the extracting force, according to the axis of the pelvis—obliquely downwards—not jamming the blades beneath the arch of the pubes; and moving the forceps antero-posteriorly, so as to gain room by further dilatation. By pressure of the finger, the bladder is prevented from descending along with the stone; or, in other words, counter-extension is made to the extension of the forceps, fixing the bladder, and allowing extraction to be made more effectually than it otherwise would be. After having passed the prostatic wound, resistance may be offered by fibres of the levator of the anus—insufficiently divided by the incisions; this obstacle may be overcome by the finger also; or it may be necessary to notch the resisting fibres by the edge of a probe-pointed bistoury.

In the case of a number of small stones, the metallic scoop will be found generally preferable to forceps. The instrument is first used as a sound, passed through the wound; the stone, having been found, is moved towards the opening in the bladder; and then—if not before—being brought in contact with the point of the forefinger, is withdrawn—steadied on the scoop by the finger's pressure.

Sometimes the stone is lodged above the pubes, and refuses to descend. In such a case, curved forceps are of use; but the difficulty is of rare occurrence. Bent forceps may also be useful, when, in an old man, the stone is lodged in a deep pouch of the bladder, behind a prostate very much enlarged.

The stone may be encysted; a part only projecting into the bladder. The forceps seizing the projection may bring the whole away; if not, it may be necessary—when the part is within reach of the finger's point—to dilate the cyst's orifice slightly, by a probe-pointed bistoury. If the stone be firmly impacted, and not to be loosened safely by the bistoury's edge, the operator must have recourse to expectancy. The wound is occupied by a full-sized tube; and, during the suppurative stage that follows, it is hoped that the textures may relax, and the stone be disengaged. Then it may be removed in the ordinary way, as has been experienced. Fortunately, however, such a complication is of rare occurrence.

On one occasion, in contending with an encysted or sacculated stone, it was found impossible to seize the stone otherwise than with the coats of the bladder in which it was held. Retaining it thus by the forceps, bringing all down within reach of the finger, and with this pushing back the soft parts gently while the forceps yet kept their hold, the stone was extracted.[1]

Should the calculus break and crumble under the forceps, the scoop will be found well adapted for removing the fragments. And in such cases, to make sure that nothing is left behind, it is well to wash out the bladder. This may be done in two ways; by means of an ordinary enema-syringe, the tube being introduced by the wound; or, by means of a syringe and catheter—the latter introduced by the urethra—a powerful stream being made to issue by the wound, while the patient is placed in a sitting posture.

The stone or stones—readily felt by the finger, forceps, or scoop—having been removed, the Searcher is introduced—a metallic sound, with a large bulbous extremity; and by this each part of the bladder is carefully explored, in order to make sure that no stone or other foreign body remains behind. It is also useful to examine the stones themselves; if one be removed, and found smooth, or hollowed, at one or more points, we may be tolerably certain that there is at least another in the bladder; if, on the contrary, a stone is found rough and unrubbed at all aspects, we may conclude that it is solitary. Then a gum-elastic tube is introduced, and retained by tapes fastened to a bandage round the belly; the tube being of length sufficient to admit of one extremity projecting from the outer wound, while the other is lodged in the bladder; and of diameter sufficient to afford a free escape to both blood and urine. The nates having been sponged and wiped, the patient is unbound and lifted into bed; and is there placed with the shoulders elevated, so as to favor outward passage of urine, by sloping the track of the wound. The knees are elevated, and placed slightly apart—supported in the ham, if need be, by a pillow; and an oil-cloth and sponge are comfortably arranged for the reception of urine and protection of the bed-clothes. If much pain is complained of, an anodyne is given; and henbane is preferable to opium, being less likely to interfere unfavorably with secretion of urine. The regimen is antiphlogistic for some days; and plenty of diluents are given, so as to favor diuresis; barley water, for example, is taken *ad libitum;* and it may not be amiss to medicate it slightly with the alkaline carbonate, so as to insure the urine being bland as well as plentiful. Copious "wetting" is always a favorable sign; denoting a heathy condition of the kidneys, absence of febrile disturbance, and but slight risk of dangerous infiltration.

The tube is retained, until there is reason to believe that the margins of the wound have become "water proof," by consolidation and glazing consequent on plastic exudation (*Principles*, 4th Am. Ed. p. 557); the object of this instrument being twofold—the prevention both of urinary infiltration, and of accumulation of blood within the bladder. It is also useful in the event of hemorrhage from the deep wound, as will be stated immediately. During the first few hours, an assistant should frequently introduce a quill, or other suitable instrument, for the purpose of preventing occlusion of the tube by coagulated blood; but when the urine is coming clear, this precaution may be dispensed with. No dressing of the wound is necessary until the tube is out; and then simple water-dressing, afterwards medicated as circumstances indicate, is all that is required. When we wish to remove the tube, it is sufficient to cut the retaining tapes; and this may be done after twenty-four hours in the young, but not till nearly twice that time has elapsed in the aged—the plastic process being much more speedy and perfect in the one case than in the other.

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[1] Monthly Journal, Feb. 1848, p. 574.

After withdrawal of the tube, the wound contracts by the ordinary process of healing. And, after about eight days—sometimes sooner, sometimes later—uneasy sensations are begun to be complained of in the urethra, betokening restoration of its function as to the passage of urine. The first flow by the natural channel is partial, and accompanied with pain; day by day, less and less comes by the wound, and the uneasy sensations in the urethra disappear. Ultimately the wound heals, and all is normally re-established. If any unusual delay occur, it may be necessary to pass a catheter gently; in order to ascertain the state of the urethra, and clear away obstruction if necessary; at the same time inviting the flow to its original course.

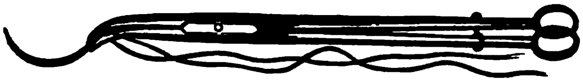
During the after part of the treatment, diet is gradually amended, as circumstances indicate; the erect posture is resumed, and the patient may be permitted to move about a little, even before the external wound has quite contracted. Such medical treatment, by hygiene, will be continued, as is suited to prevent recurrence of the diathesis on which the stone's formation depended. The operation, in many cases, seems to have the effect, not easily explained, of changing the system wholly in this respect—reproduction of stone, after well-performed lithotomy, being by no means common; yet it is well in all cases, by maintenance of due prophylaxis, to leave no means untried of preventing so unpleasant a relapse.

Such is the usual result of an ordinary and successful case of lithotomy. But there are risks and casualties which now fall to be considered.

I. *Hemorrhage.*—If there be a transverse artery of the perineum, of any considerable size, it may be troublesome by bleeding; it cannot be avoided in the incisions; but it can very readily be secured by ligature. By attending to the following circumstances, wound of the artery of the bulb will be avoided, when that vessel follows its ordinary course; making the free external incision of no greater depth than the superficial fascia; cutting afterwards on a low level—sloping the main wound obliquely upwards, from the level of the anus to the membranous portion of the urethra; never using the knife but with its back directed upwards; using the finger, to dilate, more freely than the knife to cut, in making the

ound of the perineum; taking care to enter the knife's point, in
oove of the staff, behind the bulb; and, at this part of the opera-
invariably moving the knife from the operator, with its back
s him. If the artery follow an unusual course, it may, perhaps,
ected and avoided; when the operator adopts the safe and good
e of invariably preceding and accompanying his knife's point with
ger. When the vessel is wounded, three courses are open; to
t deligation at the cut point—difficult, but not impracticable; to
n aneurism needle round the trunk of the pudic, on the inside of
nus of the ischium, securing it by ligature there—also difficult,

Fig. 236.



orceps for holding a bent needle, used by Dr. Physick to pass a ligature around the internal pudic artery.]

ssible; or simply to apply pressure to the vessel in the latter
n, by an assistant's finger placed either in the wound or in the
—maintaining such pressure by a relay of assistance, until bleed-
s ceased. Veins or small arteries may bleed to excess, in the
orhood of the prostate—especially in the aged. This form of
hage is readily restrained by pressure; pledgets of lint being
ced firmly into the deep wound, along the tube—and retained, if
e, by a T bandage. This is one of the important uses of the
its presence, as an open conduit for the urine, admitting of such
g being made with perfect safety as to the chance of urinary
tion and infiltration.[1] Arnott's fluid dilator is well calculated to
ccessful compressing agent in such bleeding; the open tube occu-
the centre of the apparatus, and the compressing fluid consisting
water. By cold and pressure it is doubly hemostatic.

ndary hemorrhage sometimes occurs in the aged, in consequence
enic ulceration in the deep wound; this requires ordinary hemo-
reatment by general means (*Principles*, 4th Am. Ed. p. 322).

Peritonitis.—This is the result of inflammation in the deep wound,
ing thence to the coats of the bladder, and from the outer coat
to the general peritoneum. Or it may be occasioned by violence
done to the bladder, by forceps or scoop. It is accompanied
rdinary signs and symptoms; and is amenable to the ordinary
nt—leeching or venesection, calomel and opium, &c. It is ob-
by taking care, in dilating the deep wound, not to tear; by not
g or tearing the vesical coats in any part, through inadvertent
by the forceps or scoop; and by never operating while the blad-
n an irritable or excited condition.

Urinary Infiltration is the most serious risk in lithotomy; and

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bvious reasons, however, it is well to avoid such plugging if possible. The tube
averts risk by urinary infiltration; but the track of wound, and especially the neck
adder, is not likely to heal so kindly as if no such rough manipulation had been
l. Plugging for hemorrhage always affects the prognosis untowardly.

the one of most frequent occurrence. To obviate it, the following points are of essential importance: maintain the reflection of the ileo-vesical fascia entire at the base of the prostate: the gland being not divided throughout its whole extent by the knife. Make the general wound conical in form: the base at the integument of the perineum; the truncated apex at the prostate. Make the general wound also sloping in form, its fall being from the prostate obliquely downwards—cutting obliquely up to the bladder, not directly into it; also arranging the patient's trunk in bed, so as to favor this sloping form, obviously so well calculated for the ready draining away of the urine. In using the finger in dilatation, avoid all laceration: torn parts being but ill-disposed for rapid plastic exudation. Retain the tube for the necessary number of hours: and keep it clear from coagulum, or other source of obstruction. Further, the risk by infiltration is certainly diminished, by not operating unless the urinary organs and general system are free from excitement, the kidney acting healthily, and the urine in a satisfactory condition; and also by maintaining, after the operation, a supply of urine which is bland as well as copious—mainly aqueous, and containing but a sparing amount of saline matter. For, if infiltration do occur to some extent, it will be less hazardous to part and system under such circumstances, than if the infiltrated fluid were the acrid and scanty urine of fever or of renal disease.

Urinary infiltration is indicated by the following symptoms: A hot pain is felt in the site of the deep wound, thence creeping up the left hypogastric region, which by and by becomes tender on pressure; the pulse grows rapid and weak—denoting constitutional irritation, not inflammatory fever; the skin is hot and dry; the tongue and lips are parched and dark-colored; the wound is dry and glazed in its edges, afterwards emitting a fetid sanies; and the secretion of urine is in great measure arrested. Ultimately hiccough comes on, the abdomen grows tympanitic, and the patient is carried off in typhoid prostration. The local changes are—sloughing of the infiltrated areolar tissue, under an asthenic inflammatory process; with thin, fetid discharge.

Treatment is by the ordinary means, adopted to bear the system through the irritation dependent on such a cause. And if the wound do not seem free and sloping enough, that defect may be remedied by enlargement of the external wound at its lower part. At first we may be for some time uncertain whether the case is one of this nature, or peritonitis; and then a sparing application of leeches over the tender hypogastrium is expedient. After infiltration is declared, however, further spoliation or depression is quite unwarrantable. By some it has been thought advisable to enlarge the wound, and to divide the rectum at the same time, by the sweep of a curved bistoury; on the principle of freely incising the infiltrated parts, and permitting the noxious fluids a ready outlet.

IV. *Urinary Infiltration and Peritonitis may occur together;* an unhappy combination—known, or at least suspected, by a blending of the signs and symptoms of each. In treatment, it is preplexing to determine whether the one disease shall be more considered than the other. But it is, perhaps, a safe general rule, to award pre-eminence to infiltration; treating it much in the ordinary way; in other words, endeavoring to support the system at all hazards, and hoping to afford it an opportunity of struggling through the inflammation.

V. *The Wound may Inflame untowardly;* suppurating copiously; perhaps sloughing. This is dangerous to a weak frame, by reason of the grave amount of constitutional disorder which attends, more especially when the deep part of the wound is much affected; the patient may sink under inflammatory fever; or he may afterwards succumb to hectic. The inflammation is obviated by care in the use of the finger and forceps while operating—neither tearing nor bruising; and it is treated by ordinary antiphlogistic means—cautiously, with a view to the coming chance of hectic tendency under a long open discharging wound. For, the sloughs must separate; enlarging the wound, and necessarily delaying greatly the process of cure.

VI. *Cystitis* is to be obviated, by operating only in a quiet state of the bladder; by avoiding bruise of the prostatic wound; and by using the forceps and scoop with all gentleness, in reference to the coats of the viscus.

VII. *Aggravation of Renal Disease.*—Plain indication of organic disease in the kidney is in most cases held sufficient to contraindicate the operation. But the symptoms of this, obscure and masked, may have deceived the surgeon. In such circumstances, the aggravation following on the operation will be subdued with difficulty; the patient will in all likelihood perish.

VIII. *Constitutional Irritation* may prove dangerous in one of two forms;—1. As a *Shock;* the immediate consequence of the operation. This may occur to a grave extent, as after other severe operations; and the patient may never rally—death taking place within twenty-four hours, by sinking. Or *Hectic* may ensue; in consequence of the wound remaining long open, and emitting a copious discharge; as is apt to occur after inflammation of its track in a weakly patient. Then we have to invite restoration of the urethral flow, by cautious use of a catheter; to favor closure of the wound, and diminution of the discharge, by suitably stimulant dressing; and to maintain the powers of the system, by the general treatment adapted for hectic. Sometimes, this state of matters has been found dependent on the presence of another stone within the bladder, preventing closure of the internal wound; overlooked in the operation; or, perhaps, since descended from the kidney. Under such circumstances, it is our duty to dilate the wound, and to obtain extrusion of the stone by the scoop or forceps.

IX. *Erysipelas* may occur; extending from the wound to the nates and thighs, as well as to the perineum and abdominal parietes. It is obviated, by not operating unless the primæ viæ are in a satisfactory condition, and by great attention to cleanliness; maintaining a proper staff of attendants, who keep the patient dry, clean, and as comfortable as circumstances will allow.

X. *The Wound may become Fistulous.*—It may contract to a certain extent, and then remain stationary; a portion of the urine continuing to pass through the fistulous track. This remote result is more troublesome than dangerous. The urethra will most probably be found at fault—

obstructed in some part of its course by former stricture, or by recent swelling; and the catheter or bougie has to be used accordingly. After the clearance of this canal, the perineal fistula will probably close. If not, it is to be treated as obstinate fistulæ usually are; by application of a hot wire, at long intervals (*Principles*, 4th Am. Ed. p. 199).

Rectal Fistula sometimes results, by wound of the bowel at the time of the operation; or it may be caused more remotely by ulceration. The aperture may close, with the rest of the wound. But not improbably it remains open: fæces finding their way upwards into the track of the general wound, and urine passing into the rectum. Such a casualty is obviated by care, during the operation, in interposing the left forefinger between the knife and the bowel, and always using the former most cautiously. Treatment consists in dividing the coats of the bowel up to the aperture, as in fistula in ano; but this is not done at once; an opportunity is first afforded for spontaneous closure.

Such are the more important and ordinary dangers and difficulties which attend this operation. We are constantly liable to meet with others, however, which can scarcely be brought under any categorical arrangement; and yet for them the surgeon must be at all times prepared.

The operation of lithotomy, in itself difficult, beset with many dangers, and implicating important parts, cannot be expected to prove very highly successful, even in the most skilful hands. The average proportion of deaths, hitherto—in the general practice of surgery—may perhaps be stated at one in five or six.[1] But as our science and art advance, it is to be hoped that the result will rise proportionally. Some individual operators have attained to pre-eminent success in this department; a preeminence apparently due, partly to operative dexterity and skill, partly to careful and judicious treatment both before and after the operation, partly to a wise selection of cases. The age of the patient has much to do with the prognosis. In childhood, recovery is the rule, death the exception. And the hale old man is more favorably situated than the robust and young adult. As a general rule, however, the chances of recovery diminish with increase of age—as well as with increase of size in the stone.[2]

Varieties in Lithotomy.

In young children, the operation may be done with a common scalpel. And it is essential to remember that in them the bladder rises comparatively high. The rectum is then the predominant viscus of the pelvis; and great care must be taken accordingly, not to injure it by the knife. The patient may be exempted from deligation; held firmly on an assistant's knee.

The Bilateral Operation.—When the stone is known or suspected to be of large size—too large to pass through the ordinary single wound of the prostate, but not too large to pass through the outlet of the pelvis easily—the wound is made *bilateral*, as has already been explained. But such bilateral section seems quite unnecessary in ordinary cases.

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[1] In a recent table the average is stated at 1 to 6·62. Lancet, No. 1534, p. 71.

[2] *Vide* Monthly Journal, Nov. 1847, pp. 325 and 326.

If, unfortunately, the surgeon have been deceived as to the bulk of the stone; and, after having made his bilateral section with perineal wound, finds that the stone is too bulky to pass, even were it out of the bladder—he must either proceed to the high operation, or attempt to break the stone, and extract it piecemeal through the perineum. The *crushing* instruments, necessary in such circumstances, need not be described. They are to be found in cutler's shops, and in the armamentaria of most lithotomists; but, fortunately, are seldom if ever called into exercise. The simplest form of instrument is probably the best; strong forceps, the blades armed with teeth, and the handles approximated by a powerful screw. The operation *a deux temps*—cutting into the bladder one day, and attempting to extract the stone on another, during suppurative relaxation—is wisely abandoned; unless in the case of obstinately encysted stone, already alluded to. In no other circumstances is such a plan of operation voluntarily adopted; but it may be thrust upon an operator by the stern force of circumstances.

The *Gorget*, too, is but little used in the present day. For the blunt gorget, the operator's forefinger of the left hand is a very superior substitute, as a guide and conductor of forceps into the bladder. And the cutting gorget, however modified, can never be so certain or so safe, as a knife's point guided and controlled as we have endeavored to describe.[1] In the hands of the careless or inexperienced, a cutting gorget may be the cause of frightful accident. Pushed recklessly on, it is as likely to be out of the bladder as in it. It may pass—has passed—between the bladder and os pubis, pushing up, bruising, detaching, or tearing the peritoneum; or between the bladder and rectum, as has more frequently been the case; in either way favoring the most hazardous infiltration, and perhaps combining this with peritonitis. In has happened, indeed, that by a more heroic thrust the bladder has been completely perforated, the intestines have protruded, and after death the liver has been found wounded!

The *Recto-vesical* operation is also out of date. It was supposed that, by cutting through the rectum, and thence reaching the posterior part of the bladder uncovered by peritoneum, less hazard would be incurred of peritonitis, hemorrhage, or infiltration. But the misery and even danger of a foul fecal fistula remaining, was found by much to outweigh the supposed safety of the procedure. Under certain circumstances, however, such an operation may be thrust upon us; as in the case narrated by Mr. Liston, where a large stone was found encysted in the posterior part of the bladder, and bulging into the rectum. In that case after the ordinary opening had been made into the bladder, it was found impossible to dislodge the stone without division of the anterior wall of the cyst; and that could not be accomplished, without incising the corresponding portion of bowel. Then the stone was readily extruded.[2]

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[1] Gorget-like knives have been invented for the purpose of rendering the prostatic wound very exact in its limits. But after trial they have been laid aside, as inferior to the ordinary knife guided by the finger.

[2] Liston's Principles of Surgery, 2d edition, p. 657.

The High Operation.—When a stone is deemed too large to pass with safety through the outlet of the pelvis, by the perineum, it is to be sought for above the pubes. By a blunt staff, introduced along the urethra, the fundus of the bladder is elevated as much as possible in the pelvis, so as to enlarge the space uncovered by peritoneum on the lower and anterior aspect. A suitable wound is made through the abdominal parietes: entering the knife immediately above the symphysis pubis, and carrying it upwards as far as seems necessary; cutting layer after layer, cautiously, until the vesical coats are reached. At the lowest part of the wound these are punctured: and, the finger having been introduced into the bladder, the aperture is enlarged to the requisite extent. The stone is seized by forceps, and removed. The wound is brought together, having a short tube—or a slip of lint, syphon-like, at the lower part, by which the urine may pass readily away, and infiltration be avoided. To aid in this indication, the patient is laid on his side; and perhaps a flexible catheter may also be passed by the urethra, and retained. But with every care, it is difficult to prevent this grave accident—so likely to occur from the non-dependent nature of the wound. And, consequently, the results of this operation are not found to be very encouraging.

Recently, an important modification has been suggested; the premising of a perineal puncture: a track of wound resembling that of lateral lithotomy, but on a smaller scale; the internal opening implicating the membranous portion of the urethra only. Through this puncture the elevating blunt staff is introduced, and may be worked more efficiently than from the urethra. After removal of the stone, a common lithotomy tube occupies the place of the staff in the perineal wound, and is retained for some days, the urine passing readily through it—the patient's trunk being slightly raised to assist in this. The supra-pubal wound is brought accurately together throughout its whole extent, and union by the first intention hoped for. And thus the operation may be not only simplified in performance, but also the great danger by infiltration may be effectually avoided.

Lithectasy.—Another recent proposal is the substitution of lithectasy for lithotomy; that is, wound of the membranous portion of the urethra, and gradual dilatation of this—for wound of both this and the prostatic portion, dilatation and extraction following immediately. Lithotomy is performed on a small scale; or a puncture is made in the central space of the perineum, above the anus. The membranous portion of the urethra is reached and open. No attempt is then made to reach the bladder and stone by the finger, but the wound is occupied by sponge-tent, or by Arnott's fluid dilator; and thereby dilatation is effected more or less rapidly. In the course of twenty-four hours, the space may be expected to be suitable for the introduction of instruments, and for removal of a small stone—the neck of the bladder being left undivided, and the great hazard by infiltration being almost certainly avoided.[1] But the manifest objection to this proceeding is, its slowness and uncertainty. Under tedious and painful dilatation the patient is very liable to suffer serious irritation, both mental and bodily; and a susceptible frame may be irreparably injured thereby. Also, after the allotted period of painful probation has passed, the space may be found insufficient; the dilator has to be resumed, or the knife is employed; and, in any way, danger is incurred. Further experience is yet required, ere the merits of this operation can be finally determined. But at present one naturally inclines to think, that it can be applicable only to small stones; and that these may be better dealt with by lithotripsy.

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[1] Willis on Stone, p. 160.

Palliation of Vesical Calculus.

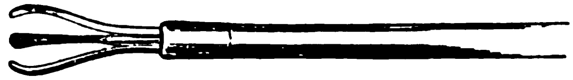
We are called upon to palliate the symptoms of stone, irrespective of any operation, when the patient refuses to submit to this, or when the circumstances of the case obviously contraindicate its performance. If the patient is far advanced in years, and suffers comparatively little from the stone, we decline to operate. When the patient is aged, and afflicted with great enlargement of the prostate—perhaps malignant—we cannot expect a successful issue; and the operation can scarcely be looked upon as a likely means towards Euthanasia. When the kidneys evince organic disease, by albuminuria, renal pain, constitutional disorder, purulent urine, &c., we cannot expect but that the operation will cause renal aggravation and death. In these cases, therefore, and such like, we content ourselves with palliating what we cannot cure. All violence and imprudence in exercise and regimen are avoided; the bowels are gently regulated; by alkaline or acid remedies internally, the condition of the urine and of the bladder is hoped to be amended; and by opiates, by the mouth or anus, pain is assuaged. When the phosphatic diathesis is not strongly marked, nothing proves more efficacious than weak doses of the alkaline carbonates much diluted.

Urethral Calculus.

Calculus in the urethra is sometimes original; foreign matter having been in some way introduced from without, and calculous deposit concreting on this as a nucleus. Much more frequently, however, it is secondary; a vesical calculus having been arrested in its progress outwards. It may be simply impacted in the canal, which dilates behind it; or it may become imbedded in a cyst or cavity—sometimes formed of the urethral parietes, sometimes of condensed areolar tissue exterior to these. In the latter case, the symptoms may be slight; there being little obstruction to the flow of urine. Impaction in the canal, on the other hand, causes much distress, by pain, frequent desire to make water, and imperfect ability to obey the call. If obstruction is complete serious danger by retention of urine ensues. The calculus, when situated anteriorly, may be felt by manipulation in the course of the urethra.

Treatment varies according to circumstances. 1. If the stone be of considerable bulk, and arrested at the posterior part of the canal—and more especially if retention of urine exist—a catheter is to be introduced, by which the stone is dislodged, and pushed back into the bladder. There it can be afterwards dealt with by Lithotripsy. 2. If the stone be small, and situated anteriorly, it is to be brought to the orifice of the urethra, and thence extruded. Such forward movement may be effected by the fingers simply. Or a loop of wire may be insinuated past and behind the stone; and thus it may be extracted, like a cork out of a bottle. Or it may be seized by small dressing-forceps; or—more readily—by Hunter's forceps. Or a bent probe may be passed behind, and by it extrusion may be effected, as in the case of foreign bodies lodged in the nose or ear. 3. But the stone may be fixed, and not inclined to move in any direction. Then it is to be cut out. If situate in the prostatic or membranous portions, the operation of lithotomy on the gripe may be had recourse to. The fingers of the left hand, passed into the rectum, push the stone forwards on the perineum; and there, through a semilunar incision made across the raphé, above the anus, it may be extracted. Or, lateral lithotomy may be performed on a small scale. And in having recourse to this latter operation, for a stone of some size, lodged in the prostatic portion of the urethra, and long resident there, it is well to remember that considerable alteration may have taken place in the bladder. It may have contracted completely on the stone; the ends of the ureters abutting on this, and there being no cavity beyond; the urine coming away constantly, by stillicidium. If a stone be found already in the perineal portion of the urethra, it is to be removed through a direct incision, made in the centre of the raphe. If one present itself anterior to the scrotum, it is well not to excise it there; for, wounds in that situation are slow to heal, and apt to degenerate into troublesome fistulæ. By manipulation let it be brought behind the scrotum—if it refuse to advance to the orifice—and there let it be excised, through a deeper but more manageable wound. Not unfrequently a calculus, after having passed all the rest of the urethra, with more or less suffering to the patient, is arrested at the orifice. Thence forceps, or a bent probe, may remove it. But if such difficulty be experienced in the attempt, as to threaten laceration of the parts, let an incision be made to dilate the orifice, by means of a narrow probe-pointed bistoury; and then extrusion will be simple and immediate. 4. Sometimes a calculus, lodged in the urethra, works its way out by ulceration and abscess; presenting itself in the perineum or scrotum;—a tedious and unsatisfactory process, not to be wished for, or trusted to in treatment. 5. Occasionally, the fragment or the centre calculus may be broken to pieces by a drilling process. For this purpose, an instrument like Civiale's three-bladed lithontriptor, but smaller, may be employed. It consists of a canula enclosing a steel rod which terminates in a three-pronged forceps, and which is perforated by another rod, the extremity of which is sharp and hard for drilling. The forceps is closed by pushing the canula over the blades, which open again so soon as the canula is drawn back; the drill is worked by simply turning it with the hand, or, if necessary, with a

Fig. 237.



[Instrument for catching and breaking Calculus in the Urethra. (From Fergusson.)]

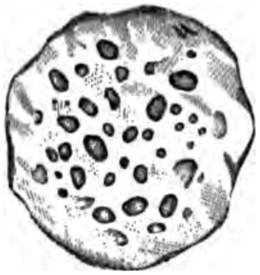
ow. When the forceps is completely closed, the instrument resembles a straight catheter; it is introduced in this condition until it touches the stone; then the canula is withdrawn, the forceps expands, and by a little management is made to enclose the calculus; the canula is again thrust forwards, the stone secured, and the drill speedily breaks it to pieces small enough to escape by the urethra.

Preputial Calculus.—When the prepuce is congenitally long, and of tight orifice, and when the patient labors under calculous diathesis, a concretion may form exteriorly to the urethra, within the cavity of the prepuce; the urine being in some proportion retained there, after micturition, and having opportunity thus afforded for deposit. The symptoms are most manifest; painful and frequent micturition; congestion of the parts; the stone to be felt by manipulation, and also on introduction of a probe through the narrow preputial orifice. Treatment is simple. By a curved bistoury the prepuce is divided on its lower aspect; and by this simple incision two evils are at once remedied: the stone is dislodged, and the condition of phimosis is removed.

Prostatic Calculus.

The term *Prostatic* is not applied to a vesical calculus, which, in its passage outwards, has been arrested in the prostatic portion of the urethra; but is properly limited to those concretions which form in the ducts of the prostate gland. They are of small size, brown, smooth, and sometimes numerous; and consist of phosphate of lime, sometimes mixed with carbonate of lime, deposited from the secretion of the ducts. They produce more or less irritation at the neck of the bladder; especially after the bladder has been emptied. When they project into the canal, a sensation of rubbing may be felt when a sound passes over them. And, if in numbers, they may be felt sliding on each other, by a finger introduced into the rectum, and pressing upon the part. Whatever tends to vitiate and retain the secretion of the ducts, tends to the formation of such concretions. Hence they are generally met with in cases of tight stricture of the posterior part of the urethra. The ordinary result is one of two events. The calculus, reaching the orifice of the duct, drops back into the bladder, and may be either extruded thence, or, remaining may constitute the nucleus of a vesical concretion. Or the stone or stones remain in the substance of the gland; perhaps leading to abscess and disorganization.

Fig. 238.



[Prostatic Calculi. (From Gross.)]

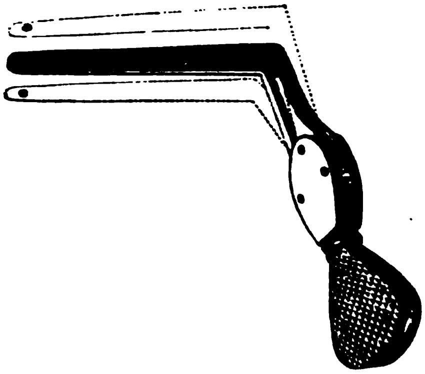
In the case of small projecting calculi, they may be dislodged by the end of a catheter; to be afterwards passed by the urethra, or to be ground by lithotripsy. And in the great majority of cases they may be passed readily enough, if no unnatural obstruction exist in the urethra. When numerous calculi lodge in the gland, a small lithotomy may be had recourse to—an operation, however, which is very seldom required.

Calculus in the Female.

As already stated, urinary concretions are comparatively rare in the female; for two reasons: because the calculous diathesis is less common: and because, the urethra being short, capacious, straight, and well-flooded, extrusion of renal formations is more probable than their retention. Nuclei are not unfrequently afforded, however, by the introduction of foreign matter from without; and these substances may be of bulk and form not favorable to extrusion under any circumstances; bodkins, pencils, glass stoppers, coal, sandstone, &c.

When a stone does form, and remains, the symptoms it occasions are quite analogous to those in the male. Perquisition is made by a short, straight, steel staff, slightly curved at the extremity. And a stone, having been found, may generally be got rid of without incision. The urethra admits of great dilatation; and if this be done gradually, but little pain is caused. Sponge-tent, Weiss's metallic dilator, or Arnott's fluid dilator, may be employed. And a sufficiency of space having been so obtained, forceps or a scoop are introduced, and the stone removed. The risk is that, in consequence of the dilatation, power of retention may be seriously impaired, and more or less inconvenience by incontinence of urine may result.

Fig. 259.



[Weiss's Metallic Dilator; the black lines show the instrument closed: the dotted lines represent the blades expanded by turning the screw, which is connected with the handle. (From Fergusson.)]

Lithotripsy was at one time supposed unsuitable to the female; but experience has shown that it is fully as applicable as to the male—the shortness and amplitude of the urethra favoring, indeed, the introduction and efficient play of the instruments. Subsequent expulsion of the fragments, too, is more easy and safe.[1]

If the stone be found of larger size than to pass by dilatation alone, and if lithotripsy should not be considered advisable, the knife is to be used—sparingly. A straight staff is introduced; on it a probe-pointed straight bistoury is passed; and the urethra is notched, upwards and outwards, on each side—the knife's edge being chiefly applied at the neck of the bladder. Dilatation is then resumed; and extraction effected.

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[1] Civiale, Traité Pratique et Historique de la Lithotritie, Paris, 1847.

A stone has made its spontaneous exit from the female bladder, into the vagina, by ulceration.

Sometimes calculous matter collects at the lower part of the orifice of the female urethra; forming a concretion of greater or less size, which becomes imbedded in a partial dilatation of the canal—bulging into the vagina. The urine passes over it, freely but painfully; it may produce most of the ordinary symptoms of stone; yet, from its lateral and sacculated position, it may be overlooked in the introduction of a sound. It is a good rule, therefore, in cases of suspected stone in the female, to direct our attention to this part, after the bladder has been explored unsuccessfully.

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CHAPTER XXXI.

AFFECTIONS OF THE BLADDER.

Cystitis.

THE inflammatory process, attacking the bladder, may be acute or chronic; and either form constitutes a formidable disease. *Acute Cystitis* may be the result of direct injury; as in Lithotripsy or Lithotomy. Or it may be a continuation, or a metastasis, of inflammatory disease elsewhere, as in gonorrhœa. Or it may be of idiopathic origin. Or it may follow the use of internal irritants; as cantharides. Most frequently it is the consequence of virulent and ill-treated gonorrhœa. The symptoms are: pain in the region of the bladder, and also referred to the perineum and sacrum, sometimes stinging along the urethra; tenderness over the pubes; the urine voided very frequently, with great pain and straining—the pain being greatest after the bladder has been emptied; the urine at first clouded with mucus, afterwards puriform in character; sometimes, after the urine has passed, a small quantity of puriform matter is expelled with much suffering; often the urine is mixed with blood; sometimes, after scanty and turbid urine has passed, pure blood escapes, in drops or other small quantity. The system is involved in smart sympathetic fever. The affection may extend by the external coat of the viscus, and general peritonitis result.

Spasm may simulate most of the symptoms; but is known by absence of inflammatory fever, and by the character of the pain—which, in spasm, is sudden in its accession, not gravescent, rapid in its disappearance, and may be intermittent.

In the treatment of acute cystitis, antiphlogistics are to be plied actively. Blood is drawn from part and system; fomentations and the hip-bath are used; antimony, and if need be, calomel and opium are given; opium, by the mouth and rectum, is usually indispensable—after bleeding—to subdue pain; and the recumbent posture must be rigidly enjoined. This last indication is indeed imperative, in the treatment of all inflammatory affections of the bladder; the erect and semi-erect postures tending obviously to favor determination of blood to the pelvic organs. The bowels are to be relieved by enemata, aided by the gentlest possible laxatives; so as to avoid straining. During convalescence, the urine will probably require a special treatment; varying, according as that fluid evinces an acid or an alkaline character.

Chronic Cystitis, or Catarrhus Vesicæ, is generally symptomatic of some other affection; of gleet; of stricture; of enlarged prostate; of stone in the bladder; of hemorrhage, or other disease of the rectum; of renal irritation. Sometimes, however, it is idiopathic. Micturition is frequent and painful, and the urine contains much viscid mucus. Often the recipient vessel seems almost entirely filled with mucus, thick, glutinous, and very adherent to the bottom. At first, it is grayish and streaked; the streaks dependent on phosphate of lime; afterwards it becomes brown, ammoniacal, and intensely fetid. Not unfrequently there is admixture of pus; sometimes of blood. The mucous membrane is thickened and congested; it may ulcerate; the muscular coat is hypertrophied, and may sacculate; the kidneys are sooner or later involved. By ulceration, it has happened that a communication between the bladder and rectum has been formed. Also, the fundus has become perforated into the sigmoid flexure of the colon; constituting an entero-vesical fistula. The system is always affected more or less. And this is the diagnostic between catarrh, and mere irritability of the bladder. In the latter, the system is comparatively free; in the former it is always involved, and in general seriously.

In treatment little benefit need be looked for, unless the obvious cause, when it exists, be removed. Stricture must be cured; stone must be taken away; the rectum must be restored to a healthy state. Disease of the kidney and of the prostate may be palliated, but are not always curable. For the disease itself, opium is of great service; allaying irritation, and lulling inflammatory excitement. The buchu, pareira, and uva ursi, with mineral acids, are useful, as in alkaline urine from other causes. Regimen is generous, rather than otherwise; to support the system. There is no tolerance of either purging or bloodletting. Iron often is of great use; and perhaps the best form is the tincture of the muriate. From a combination of benzoic acid with copaiba relief sometimes results. And counter-irritation is often of the greatest service; on the hypogastrium, or over the sacrum—the latter the preferable situation—unless, indeed, there be already too much irritation there, in the form of bed-sore. In severe cases, the actual cautery may be warrantable; to a very limited extent, however; there being no tolerance in the system of the exhaustion and irritation of a large suppurating surface.

The following are some of the principal remedies:—Opium in full doses, and repeated, so as to overcome pain and irritation. If opium disagree, hyoscyamus may be substituted. Of the mineral acids, the dilute muriatic and nitric are usually preferred; in doses of eight or ten drops, gradually increased. The pareira is given in decoction. Half an ounce of the root, in three pints of water, is boiled down to one pint; and of this from eight to twelve ounces may be taken daily; or it may be given in the form of extract, to the extent of twenty or thirty grains daily. Of the buchu and uva ursi, in the form of strong infusion, ounce doses are given three or four times a day. The tincture of the muriate of iron is administered, in doses of from eight to fifteen drops twice daily. A drachm of benzoic acid, with half an ounce of copaiba, made into an emulsion with camphor mixture, may be taken in ounce doses, in the course of forty-eight hours.

The milder cases yield to such remedies. The more severe probably do not. In them, other measures must be had recourse to; and the most promising is injection of the bladder—never to be employed, however, except in aggravated cases, and after ordinary means have failed; otherwise it may itself prove the source of no inconsiderable injury. It is also essential that no acute or subacute exacerbation be present; the disease must be thoroughly chronic. The injection is at first detergent and soothing; water, or a decoction of poppies. Then a mixture of ten minims of dilute nitric acid with two ounces of distilled water is thrown in, and allowed to remain about thirty-seconds. In two days the injection is repeated, and the dose of acid is gradually increased; by and by the injection may be given daily—not oftener.[1] In extremely chronic cases, the bladder may be thoroughly washed out by means of a double catheter, to the main orifice of which a small enema-syringe is adapted, and by means of which apparatus a strong and continuous current is established in the viscus. Should at any time pain or even uneasiness follow the use of this means, however, the practice must be discontinued.

In very obstinate cases, it may perhaps be allowable to make a cautious trial of the application of nitrate of silver, in substance, to the mucous coat, as proposed by M. Lallemand. The bladder having been emptied, the porte-caustique is passed; and the stilette having been pushed forwards, a momentary contact of the nitrate of silver with the lining membrane is permitted. The instrument is then withdrawn; and a portion of the caustic, dissolved in mucus, pervades the viscus. This is to be done very warily; and the after-consequences must be anxiously watched, lest inflammation ensue.

Irritable Bladder.

In healthy states of the urine and bladder, the stimulus of the former operates on the latter only according to quantity; a certain amount of fluid having accumulated, an uneasy sensation is felt, and the bladder contracts in obedience to that stimulus, seeking relief thereby. If the urine be abnormally acrid, however; if the mucous membrane of the bladder be morbidly sensitive; or, more particularly, if both these states exist together—the ordinary stimulus of the urine is found to be intolerable, and frequent, uneasy micturition results, constituting the affection termed Irritable Bladder. Pathologically, it differs from any form of cystitis, in depending on irritation, and not on the inflammatory process; there is not necessarily any structural change in the coats of the bladder. Practically it is known by the absence of grave constitutional disorder, as well as by the absence of profuse secretion of vitiated mucus—the prominent characteristics of Catarrhus Vesicæ. No doubt, however, these affections may and do not unfrequently coalesce; the irritation inducing an inflammatory process, and becoming merged therein. Concussion and compression of the brain are often associated, yet are regarded as distinct affections; and so here.

The symptoms of Irritable Bladder are—frequent micturition, with uneasiness rather than actual pain; the desire is almost constant, the slightest quantity of accumulated urine proving an unnatural stimulus to the irritable mucous coat; and relief is obtained, on evacuation being completed. The pulse and general system are comparatively unaffected. The urine may be limpid and clear; frequently it is clouded by mucus; not unfrequently it furnishes deposit of the urates. The cavity of the bladder is contracted; but not necessarily with structural change. In some cases, the coats have been found thinner than in health. The source of irritation may be in the mucous coat itself. More frequently it is elsewhere; affection of the kidney—in phosphatic or oxalic diathesis, for example; ascarides, hemorrhoids, or other disease of the rectum; calculus, or other irritation in the urethra; in children, it not unfrequently depends on a contracted state of the preputial orifice. Most frequently, the affection is found to originate in derangement of the kidney and of the general health; and this at once gives the two component parts; the acridity of urine, and perverted sensibility in the mucous coat. Indeed, these morbid states very seldom are separate; for if irritation commence in the bladder, it is thence extended to the uropoietic system, and derangement of secretion necessarily follows.

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[1] For further details of the *lotura vesicæ*, see Monthly Journal, May, 1850, p. 482.

Treatment consists in looking for a cause, and in removing it, if possible; amending the stomach, bowels, and general health; and restoring the urethra, rectum, and other parts to a sound state. By anodynes, given by both mouth and anus—but especially in the latter way—the irritation is subdued. And, throughout, a constant regard is had to the state of the urine. The small doses of alkali, largely diluted, are often found very serviceable. Recumbency is advisable; at all events in cases of severity. And should these simple means fail, recourse is had to smart counter-irritation; by blistering above the pubes, or over the sacrum.

Mental anxiety induces a temporary simulation of this disease; or, perhaps, it may be said to cause a variety of it. The mucous coat is increased in sensibility, and the whole frame is in unwonted excitement. The urine is not acrid; on the contrary, it is copious, pale, aqueous, and bland; and stimulates by quantity, rather than by quality. In this case, hyoscyamus and other direct sedatives are all-powerful; together with attention to the manifest cause of the disorder.

Hœmaturia.

By this term is understood spontaneous discharge of blood from the urethra. It may proceed from different sources. 1. *From the Kidney.*—Stone in the kidney is often accompanied by discharge of blood from the mucous membrane in contact with the stone; more especially after violent exercise, error in diet, or other source of aggravation in gravel. Blows on the renal region cause hæmaturia; the blood in such a case sometimes passing in large quantity. Occasionally the occurrence takes place without any assignable exciting cause, in cases of structural disease of the organ.

The renal source of the hemorrhage is known, by the blood being diffused equably through the urine; by the expelled fluid containing cylindrical portions of fibrin, like small worms, the result of coagula in the ureter—sometimes colorless, sometimes of a pale pink hue; by the appearance of blood being preceded and accompanied by pain and heat in the loins, and other renal symptoms;—and more especially when such symptoms are present on one side only.

Treatment consists in such means as are best calculated to remove the cause. In the case of external injury, rest, fomentation, low diet, leeching if necessary. In the case of stone, the palliative or more thoroughly remedial measures, which we have already seen to be suitable in this disease. In the idiopathic hemorrhage, connected with a generally relaxed state of system, and threatening exhaustion by continuance, such remedies as are useful for passive hemorrhage—more especially rest, local application of cold, and internal use of gallic acid.

2. *From the Bladder.*—This is the most frequent variety; as already seen, a very constant attendant on vesical calculus; and then liable to be aggravated by circumstances. It may also proceed from a congested or inflamed state of the mucous membrane, unconnected with the presence of any foreign body. More or less, it is common in cystitis. From ulceration of the mucous coat it cannot fail to occur. But perhaps the most frequent source, next to that of calculus, is enlarged and ulcerated prostate. And if this state coexist with calculus, the loss of blood is likely to be both large and frequent. Malignant tumor of the bladder as it ulcerates, must furnish blood; and a large amount may flow from injury done to the coats of the viscus, by ill-managed catheters, bougies, or lithontriptors. Worms lodge in the bladder; sometimes, though rarely; and they have been known to occasion profuse and even fatal loss of blood.

Vesical hemorrhage may be so profuse as to furnish blood tolerably pure from the urethra. And, in general, this variety of hæmaturia may be known, by the blood not being mixed with the urine; the latter fluid passes off first, tolerably pure; and the blood comes last, more or less changed by mixture with the residue of the urine. It is also known by the absence of renal symptoms; and by the presence of undoubted signs of stone in the bladder, or other disease of that viscus, or of affection of the prostate. In the case of direct injury done to the bladder by instruments, there need be no room for doubt. Treatment, varying according to the cause, is plain and obvious, and need not be particularized.

Sometimes blood escapes in large quantity—in the case of stone, or enlarged prostate—and accumulates in the bladder; coagulating, and causing retention of urine. A hard tumor is felt in the hypogastrium; the ordinary distressful signs of retention are all present; on introducing the catheter, only a small quantity of bloody urine passes off; the fibrinous clot may be felt plainly enough, on moving the instrument's point; and, on withdrawing the catheter, it is found more or less obstructed by coagulum. If the symptoms be not urgent, we may content ourselves with occasional introduction of the catheter, to remove what loose fluid there is; the coagulum gradually dissolves in the urine, and comes away. If urgency exist, however, it is advisable to inject a small quantity of warm warm; and then, by the exhaustion of a powerful and well-fitting syringe, to endeavor to break down and remove at least some of the clot. In the case of spontaneous disruption of stone, attended with such complication, it is expedient to have instant recourse to lithotomy, provided the state of system be found sufficiently tolerant of such a severe proceeding.

3. *From the Urethra.*—In this case there is absence of both renal and vesical symptoms; the blood passes pure, irrespective of any desire to evacuate the bladder; and there is usually some plain cause for the accident—as injury, inflammation, erection in chordee, or excessive venereal excitement. The application of cold, with recumbency, usually suffices for arrest. In extreme cases, following chordee, pressure may be made on or near the orifice, and at the perineum; so as to include the source of bleeding between the two compressed points—preventing escape in either direction, and converting the effused blood into its own hemostatic. In the case of wound, the ordinary principles of surgery are put in force.

Enuresis, or Incontinence of Urine.

Practically, this affection may be divided into that which affects the adult and the aged, and that which occurs in children. In the former, one of two events has taken place. Retention of urine has occurred; the bladder has become greatly distended; and the recently secreted urine, finding no room in that viscus, dribbles away slowly and involuntarily by the penis. In other words, incontinence in this case is but a symptom of a more serious affection—retention of urine. Or, as more frequently happens in the aged, the parts have simply lost their tone; the expelling power is small, while the retaining power is almost or wholly gone; and the urethra is little more than a passive tube, through which the urine flows outwards, shortly after secretion. In the former case, treatment is by the use of the catheter; directing our attention to the true disease—retention.[1] The other form is regarded as but one of the many signs of senile decay. Temporary relief may in some cases be afforded, by the internal use of nux vomica, or strychnine; a degree of tone being restored to the parts for a time. But, in general, we have to content ourselves with attention to comfort and cleanliness, by the wearing of urinals [Figs. 240, 241] adapted to the circumstances of the case.

In the adult, incontinence of urine sometimes follows rheumatic or other fevers; it may also result from injury of the spine; and it is an ordinary symptom of the slow degeneration of the spinal cord formerly spoken of. Nux vomica or strychnia, cantharides, and tincture of the muriate of iron, with blistering over the sacrum, are the most likely means of benefit. In some cases, the application of electricity to the parts affected has been of service. The remedies are plainly of that class which tend to restore muscular and nervous energy.

Enuresis in children is extremely common; very much allied to irritable bladder; but differing in this, that while, in the latter affection, evacuation of the bladder is voluntary, in this case it is involuntary. During the day, the child makes water with unusual frequency, perhaps;

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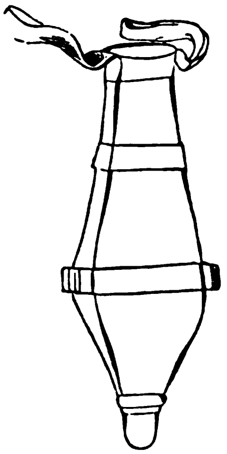
[1] Called to a case of incontinence in the adult, the existence of distended bladder should always be suspected, and examination made accordingly.

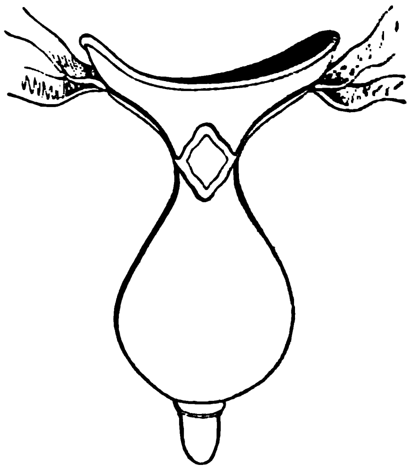
at night the urine is passed involuntarily; and this unpleasant habit may continue in adolescence. Corporal discipline may still be the favorite remedy among nurses, and with some parents; but it is as ill-judged, as it is cruel and unnatural: the child might as well be punished for club-foot or the measles. The involuntary escape of urine is the result of a morbid state, and requires curative treatment. Usually, the general system will be found out of tone; and this is to be obviated by the ordinary remedies; more especially by cold bathing, and by small doses of the tincture of the muriate of iron. At certain stated hours, during night, the child should be awakened for the purpose of emptying the bladder; and, if possible, he should be prevented from sleeping on his back, and from so exposing the most sensitive part of the bladder to contact with the urine. The bowels must be kept in good order; and the state of the rectum should be especially attended to. Ascarides may probably be found there; if so, they must be expelled. Certain means are supposed to have a special effect on the bladder. The nux vomica, or strychnia, is certainly of use; perhaps by allaying irritation, as well as by increasing tone at the neck of the viscus. The nitrate of potass has proved serviceable; and, in such cases, it is probable that the urine was scanty, acrid, and consequently unusually stimulant. In other cases, the more ordinary means having failed, benefit has accrued from cantharides internally; and in such cases, probably, there was a sluggish condition of the neck of the bladder and adjacent parts. The effect of this remedy has also been explained, by supposing that, acting as an irritant on the lining membrane of the urethra, especially at its posterior part, it produces turgescence there, so rendering the potential canal less easily opened up. Amendment has not unfrequently followed the application of a large blister over the sacrum; but whether by the principle of counter-irritation, or from sleeping on the back being thus effectually prevented, it is not easy to determine. Mechanical means—as the jugum penis—are not to be thought of.

Fig. 240.



[Male Urinal. From Gross.]

Fig. 241.



[Female Urinal. From Gross.]

It may happen that a boy, ashamed of his infirmity, and perhaps impelled by desire to escape corporal punishment, voluntarily has recourse to mechanical aid; and, at bedtime, constricts the penis by a ligature, or a curtain ring, or other suitable means which may occur to him. In the morning, he finds the parts swollen and painful; he is unable to remove the jugum; and, afraid of the consequences of a disclosure, he suffers in silence. The swelling increases; ulceration takes place; the foreign body becomes imbedded in the inflamed tissues; the penis may be gradually cut through; and, the urethra having been at length reached, a calculus begins to be constructed there. Such cases have been recorded by Liston, Helot, and others. Contrary to expectation, the erectile capabilities of the organ do not seem to have been impaired by the gradual transverse section.[1]

If called to such a case, after some days, with the constricting agent sunk in inflamed parts, a free incision is to be made upon the offending body; which, having been exposed, is to be divided—by knife or pliers, according to its nature—and removed. If called early, a tight ring may be taken off, as from the finger, thus: pass the end of a stout and long thread beneath it, leaving the pubal end loose and prehensible; roll the rest of the thread tightly and closely round the penis, in front of the constricted part, so as to invest it wholly; then gradually unroll from the pubal end; and the ring is shuffled forwards, as the thread is made to uncoil.

Retention of Urine.

This serious calamity may arise from a variety of causes; and treatment varies accordingly. The symptoms are: inability to evacuate any urine, while desire to do so is great, constant, and frequently aggravated —with straining, pain, and much distress. The bladder, rising in the pelvis, is felt above the pubes, and also by the finger introduced into the rectum; pressure above the pubes causes great pain, and percussion is dull there; in extreme cases, the bladder may become an abdominal tumor almost as large and distinct as the gravid uterus—oval, tense, and fluctuating. If the bladder have been previously contracted in cavity and thickened in its coats, the ordinary symptoms of retention may be occasioned by the incarceration of but a small quantity of fluid; and then the tumor can be felt only by the rectum or vagina. In other cases, the bladder distends readily; and the tumor may be both large and high in the abdomen, before unpleasant feelings are complained of. As the case proceeds, pain and straining, with sickness, become more and more unbearable; the pulse rises, the skin grows hot, the tongue is dry; breath and perspiration may evince a urinous odor;—"urinous fever" is established; absorption of the vesical contents has begun. By and by the ureters become distended, as well as the bladder; increasing pressure is thus made upon the kidneys; their secretion is arrested in consequence; and suppression of urine, supervening on and caused by the retention, tends to produce coma and death.

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[1] Lately, in operating on a little boy, on account of chronic paraphimosis, with preternatural opening of the urethra behind the glans, I found a tight piece of packthread deeply imbedded in the penis, and constituting the true stricture.

If the bladder be relieved, the urgent symptoms disappear speedily; the patient passes from torment to Elysium; and under no circumstances will he be found more eloquently and sincerely grateful. He must be seen again soon, however, otherwise the unpleasant symptoms may be speedily restored. The kidneys, compressed by the enlarged and full ureters, had for some time been secreting little; on removal of that pressure, the secretion is renewed copiously, and the bladder may be soon refilled.

If no relief be afforded, a serious local accident is likely to occur, before the system has become fatally prostrate. The bladder or the urethra gives way; either by ulceration, or by actual tearing under strong action of the detrusor; and extravasation of urine takes place—of urine, be it observed, deprived of much of its aqueous part, intensely saline and acrid. The inevitable result is sloughing of the infiltrated parts; too generally followed by rapid sinking of the patient. Obviously, therefore, it is of the utmost importance to afford early and effectual aid in this affection.

1. *Retention from Stricture of the Urethra.*—In this case, perhaps the most common, danger is especially great; the thickened and powerful middle coat of the bladder laboring hard to overcome the obstacle to evacuation, and consequently rendering solution of continuity all the more imminent.

The patient has long been in the habit of making water tardily and ill; at last the passage seems effectually closed; and the ordinary distress of retention supervenes. Probably an exciting cause may be found; indiscretion at the dinner-table, injudicious use of a bougie or catheter, exposure to cold or wet, or an attack of piles. The previously narrowed canal has become occluded by congestion, or by the swelling attendant on an active inflammatory process, in the affected part; and, no doubt, there is also spasm.

If the history of the case and its symptoms be such, as to lead us to suppose that the strictured urethra is inflaming or inflamed, the catheter must be withheld; unless indeed the case be far advanced, and the safety of the parts from extravasation already endangered. Leeches are applied to the perineum, in clusters; or cupping is had recourse to; the patient is seated in a warm hip-bath—and this bath need not be delayed till leeching is over, as the animals will not be disturbed by comfortable immersion. A full opiate is given, by the mouth or by the anus; or in both ways. Very probably, such relaxation occurs as to obviate all necessity for the catheter; urine dribbling away in the bath, and then perhaps coming in a tiny stream, sufficient to relieve all urgency of symptoms. In the event of failure, however, after a reasonable time and trial, the bladder must be relieved at all hazards.

In those cases where we have no reason to suspect an inflammatory attack, the catheter is used at once; of small size, steadily yet gently persevered with; the patient under chloroform. Sometimes the silver instrument refuses to pass, while a gum elastic one, straight, and deprived of its stilet, enters the bladder with comparative ease. Sometimes it happens, that after the end of a silver catheter has been pressed steadily for some time on the stricture, and withdrawn, the urine begins

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to follow. In no case is force or violence to be employed. But, when unsuccessful with the catheter and the auxiliary means already noticed, the bladder must be relieved at all hazards—through the perineum, or by the rectum, as will afterwards be stated.

2. *Retention from Urethritis.*—The inflammatory process may attack the urethra, independently of previous stricture; causing turgescence and occlusion. This may be the result of gonorrhœa, or of direct injury. Retention supervenes gradually; and there is time for antiphlogistic treatment. To this we trust; leeches, fomentation, hip-bath, antimony, &c.; withholding the catheter, if possible; inasmuch as its use, even though successful in relieving the bladder, must aggravate the inflammatory affection, and tend to repetition in a worse form.

3. *Retention from Irritation and Spasm at the Neck of the Bladder.*—This may take place, irrespective of the inflammatory process, or of organic change. In the dissipated, it is no uncommon result of a late carousal; calls to evacuate the bladder, it is probable, having been imprudently neglected. A hip-bath, with an anodyne—opium or hyoscyamus, by the rectum or by the mouth—will usually give relief. If not, a full-sized catheter is to be passed, gently.

4. *Retention from Priapism.*—Priapism is a common result of spinal fracture; and sometimes it occurs in connection with venereal excess. In the former case, when retention takes place, we cannot expect benefit from direct treatment of the cause; and we must use the catheter. In the latter, by opium and camphor, and antimony; by the warm bath; by an opiate enema or suppository; and by leeches to the part, if need be—we may overcome the erection, and avert the use of instruments.

5. *Retention from Abscess in the Perineum.*—Abscess forming here—in connection with stricture, or as a result of direct injury—may bulge internally, so as temporarily to occlude the urethra. Catheterism would be very painful, and not unlikely to cause rupture of the abscess into the urethra, whereby urinous extravasation might occur. The knife supersedes the catheter; the abscess is opened from without; instant relief follows; retention is overcome, and the morbid state which caused it is at the same time removed.

Similar treatment may be required, on account of an abscess forming in the body of the penis, as a remote result of venereal disease.

6. *Retention from Pelvic Abscess.*—Pelvic Abscess, bulging on the neck of the bladder, may cause retention of urine.[1] Treatment is conducted on the same principles as in the case of perineal abscess; withholding the catheter, or using it very warily; and puncturing the abscess, so as to at once remove both retention and its cause.

Retention may be simulated. The abscess may so compress the bladder as to prevent its distension; and consequently urine is almost constantly passing away in small quantity, from a collapsed viscus; while the abscess, forming a large, dull, hypogastric swelling, may be mistaken for the bladder largely distended. In one such case I thrust the catheter through the walls of the abscess, which was consequently evacuated through the urethra. The patient made a good recovery.

7. *Retention from Urethral Calculus.*—This occurrence has been

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[1] A case is narrated in the Lancet, No. 1431, p. 118.

already alluded to; impaction of a calculus taking place in such a way as quite to occlude the canal. Three courses of procedure are open to us: We may by the catheter push back the calculus into the bladder, treating it afterwards by lithotripsy. Or we may at once remove it by direct incision. Or we may bring it to the orifice of the urethra, and thence extract it—by dilatation if necessary. If the stone is small, movable, and situate anteriorly, we prefer the last mode; if it is impacted in the prostatic portion of the canal, we probably prefer the first. If it is of some considerable size, firmly impacted, and beyond the prostatic portion, we have recourse to excision.

8. *Retention from Injury of the Perineum.*—1. Extensive bruise of the perineum may cause retention, irrespective of any injury done to the urethra; the extravasated blood bulging inwards on the canal. In such a case, the catheter must be used, until by absorption the compressing agent has been diminished or taken away. 2. Again, injury of the perineum may induce inflammation, either in the urethra itself, or in the parts exterior to it; and, in the latter situation, abscess may form. The treatment advisable under such circumstances has already been stated. 3. When the urethra has been torn or cut, there is no room for delay; retention must not be waited for; the catheter cannot be too soon introduced. For, if the patient have made an effort to evacuate the bladder, before such introduction, urine will certainly have escaped at the injured part, causing all the deadly results of extravasation. And only by early introduction of the catheter—retaining it until consolidation shall have taken place at the injured part—can extravasation be avoided.[1] If the urethra have been completely torn across, there may be difficulty in passing the instrument; nay, not improbably, the surgeon may be altogether foiled in his attempt to penetrate the vesical orifice—shrunk, retracted, and displaced. Under such circumstances, a free perineal incision must be made so as to expose the part; and then the catheter is passed through and retained. It is surely much better to make a limited incision, with the view of preventing extravasation, than to be compelled to incise largely afterwards, for the escape of sanies and sloughs, after urinary infiltration has occurred.

9. *Retention from Paralysis.*—A paralytic state of the detrusor may be the result of accidental over-distension merely; of spinal injury; of general debility, as in fever; or of senile decay. The ordinary call to evacuate the bladder having again and again been neglected, under circumstances of restraint, the sufferer, when liberated from these, will probably find no urine coming in obedience to his utmost efforts at expulsion. The muscular fibre of the detrusor has been over-stretched, and, for the time, is paralyzed. The catheter cannot be used too soon; and its introduction is to be repeated from time to time, never allowing any considerable quantity of urine to collect; so that the normal dimensions of the bladder, and the wonted functions of its muscular coat, may be speedily restored. Should the return of contractility be slow and im-

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[1] It is a good general rule, in all cases of serious injury done to the perineum, to pass the catheter very cautiously, immediately on being called to the patient. If urine come away clear, it is a good omen, and a point is gained both in diagnosis and treatment.

perfect, strychnine or nux vomica may be given, or electricity may be employed.[1]

In the case of spinal injury, the circumstances are very distressful; for, in addition to retention being ever liable to occur, there is phosphatic degeneration of the urine, with more or less change in the lining membrane of the bladder. The prominent symptoms of retention, however, are probably less urgent than in other cases; there being usually diminished sensation in the viscus, as well as impaired muscular power. Occasional relief, too, may come, by partial escape of urine; for, the abdominal parietes may act on the bladder when greatly distended and risen; taking on themselves, in some measure, the lost function of the detrusor. Also, as the bladder changes in its coats, the middle coat, becoming hypertrophied, may acquire an increase of power, so as to effect a partial evacuation; the muscular coat, which is not excited to contraction so long as the mucous coat is in a healthy condition, acquires a degree of "abnormal contractility." In such cases, treatment is mainly spinal. The catheter is used from time to time; the usual means are taken to correct the depraved state of the uropoietic system; and, during convalescence, recovery of power in the muscular coat may perhaps be promoted.

In protracted fever, retention is not uncommon, often with incontinence. It is obviously of much importance to detect this condition, and by catheterism to prevent it; otherwise a most injurious influence will be exerted on the already oppressed system, by absorption of the urine confined within the bladder.

In the aged, the detrusor, as other muscles, grows feeble; and, by reason of this, retention may occur. Relief is got by the catheter; and something may be done in amending muscular energy—at least for a time.

10. *Retention from Diseased Prostate;* it may be, from either an acute or a chronic enlargement of the gland. In gonorrhœa, the prostate is liable to the occurrence of acute swelling, with or without the formation of matter; and this may be to such an extent as to shut up the posterior part of the urethra. Treatment is by antiphlogistics; withholding the catheter, if possible. If abscess have formed, it must be evacuated externally, by incision; as in the case of similar affection of the perineum. In chronic enlargement of the prostate, peculiar to advanced years, relief can be had only by the catheter. And an instrument must be employed of large curve, and at least two inches longer than that in ordinary use; for, by the prostatic enlargement, as well as by elevation of the bladder when distended, very considerable elongation of the urethra takes place, and an ordinary instrument must necessarily fail to reach the bladder—as will afterwards be more fully explained.

It is in this form of retention that incontinence of urine is so apt to show itself as a symptom. For years, perhaps, the bladder has been imperfectly evacuated; a certain amount of residuary water has always lodged in that viscus; and the amount increases; at last, the bladder becomes completely distended, and the urine which comes fresh from the ureters—as surface water—dribbles over and is involuntarily discharged.

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[1] Probably the most effectual way of applying this agent is to introduce a silver catheter into the bladder, and a female catheter into the rectum, with its point resting on the recto-vesical parietes; and to connect each of these catheters with one of the poles of the electric machine.—(Monthly Journal, August, 1850, p. 174.)

Very frequently, the kidneys become diseased. In such a case, the catheter must be used cautiously. Were it to be passed at regular periods daily, fully evacuating the bladder on each occasion, it is probable that the kidneys, thus deprived repeatedly, suddenly, and completely of the circumstances which had so long tended to restrain their secretion, would become untowardly excited, and fatal aggravation of the renal disease might ensue.

11. *Retention from Blood in the Bladder.*—If this occur in connection with spontaneous disruption of a vesical calculus, lithotomy is probably the best remedy, as already stated. In other circumstances, we have recourse to a full-sized catheter, with large eyelets; and aid its action, if need be, by an exhausting syringe. The ordinary hemostatic means are at the same time had recourse to, to prevent continuance of internal hemorrhage.

12. *Retention from Malignant Disease of the Penis.*—As carcinoma or cancer advances in destruction of the penis, secondary glandular enlargements occur, both without and within the pelvis; and, in consequence, the outlet of the bladder may come to be completely obstructed. In such retention, we can only hope to palliate, and briefly to extend the now closely meted term of existence. The bladder is relieved by puncture above the pubes, and the aperture is kept pervious.

13. *Retention from Imperforate Urethra.*—This is a state of matters analogous to retention of the meconium by an imperforate condition of the anus. The perforation necessary to complete the canal cannot be too soon accomplished.

Retention of Urine in the Female.

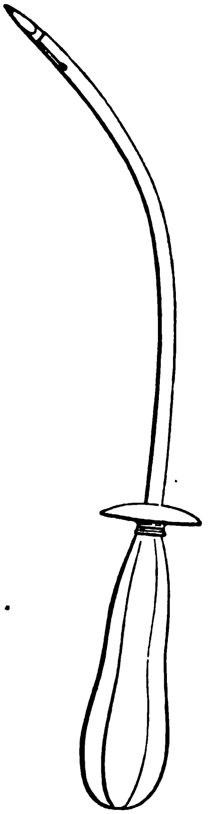
The most ordinary causes of this affection are—pregnancy, tumors, paralysis, and hysteria. The gravid uterus is likely to compress the urethra; more especially about the fourth month, when the tumor is considerable, and not yet risen out of the pelvis. Relief is by the flat catheter. Other tumors may compress and obstruct the urethra; uterine, ovarian, vaginal. Here again, as well as in the case of paralysis—of frequent occurrence after delivery—the catheter is employed. But, in hysteria, this instrument ought generally to be refrained from. Hysterical women very often labor under retention of urine, simply because they refuse the effort of volition necessary for expulsion of the bladder's contents. Use the catheter, and repetition of the retention speedily occurs, the cause remaining the same. But refuse the catheter, and allow distension to proceed, until the stimulus thereby occasioned becomes such as to compel the detrusor to its function; and then, by an effect partly moral and partly physical, the patient will find herself permanently relieved. There are obstinate cases, however, which resist this mode of cure; and, in them, care must be taken not to endanger the bladder, by an excessive withholding of the instrument.

Puncture of the Bladder.

This operation becomes necessary, when urgent retention of urine exists, and when by the catheter we have failed to afford relief. It may be performed in a variety of ways; by the perineum, by the rectum, or above the pubes. 1. ***By the Perineum.***—This is suitable to all cases of obstinate retention caused by impassable stricture, or other obstruction of the urethra; the bladder is safely relieved, and the cause is at the same time effectually dealt with. The patient is placed in the position of lithotomy; a catheter of medium size is passed down to the constricted part, and its point is cut upon by direct incision, in the central raphé; behind the end of the instrument, we expect to find a bulging dilatation of the urethra on the vesical aspect of the stricture; this is pierced by the knife; and urine rushes out, affording complete relief to the bladder. Then the knife is carried forwards, so as to divide the constricted part of the urethra, as accurately and thoroughly as possible. That having been laid open, the catheter is passed on and retained; and thus a most effectual step is taken towards permanent removal of the stricture. The operation is avowedly difficult—the dilated portion behind being not always easily found, and it requiring great care to make sure that the incisions at the constricted part lay open the canal of the urethra; but when rightly performed, it is thoroughly sound in both its principle and results. It is rarely, however, that any such procedure is demanded of the experienced surgeon; generally he succeeds by the catheter and its auxiliaries—chloroform seldom omitted.

But this may be said to be puncture of the urethra, rather than puncture of the bladder; and so it is. In strict accuracy, perineal puncture of the bladder may be held to denote the reaching of the neck of that viscus, by the thrust of a trocar and canula, or by means of a small lithotomy wound—an operation which is very seldom performed for mere retention.

Fig. 242.

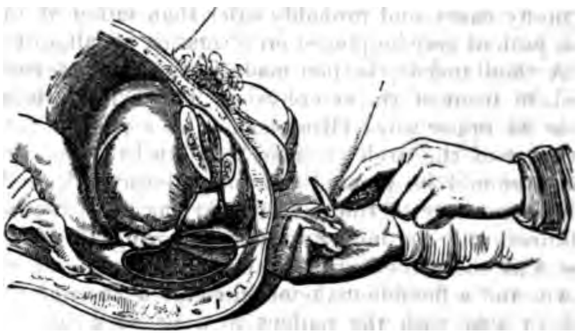


Trocar for puncture of the bladder by the rectum.

2. *By the Rectum.*—This is a simple and safe operation; but is apt to leave a troublesome fistulous communication between the bladder and bowel. We have recourse to it when foiled in the use of the catheter, and when the method by perineal incision is not considered advisable—or when that has failed; and, indeed, it may be performed in any case, by a surgeon who prefers it, except when the prostate is much enlarged. The patient is placed recumbent, with the limbs raised. The fore and middle fingers of the surgeon's left hand are introduced, well oiled, into the rectum; and their points are rested on the central space immediately behind the prostate. A long curved trocar is introduced by the right hand, with its stilet with-

drawn within the canula; the extremity of the latter is fixed on the *trigone*, between the points of the fingers resting there; and, the stilet being then pushed forward, both the trocar and its canula are lodged in the bladder. The trocar is withdrawn, and the canula is retained. If there be good prospect of speedily removing the cause of retention, the canula may be very soon taken out. Otherwise, it should be retained for some days, so as to prevent premature closure of the wound.

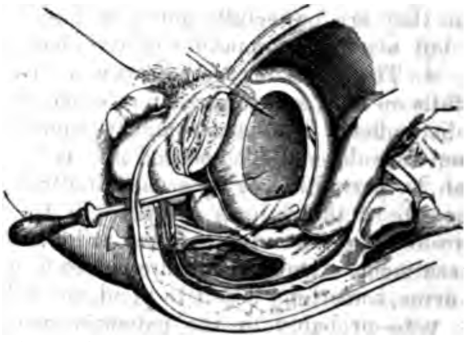
Fig. 243.



[Operation for Rectal Puncture. (From Gross.)]

3. *Above the Pubes.*—This is our last resource; when both the other methods are deemed impracticable. The operation is similar to suprapubal lithotomy. A small incision is made through the parietes, immediately above the symphysis; and through this the bladder is punctured at its lowest part, by means of a short trocar and canula—similar to what is used in ascites—directing the point of the instrument obliquely backwards, towards the promontory of the sacrum. The canula is left; or a portion of elastic catheter; or a short lithotomy tube. And the patient is laid on his side, so as to favor outward escape of the urine.

Fig. 244.



[Plan of the different points at which Puncture of the Bladder may be performed. (From Fergusson.)]

These methods of operation have been enumerated, according to what is conceived to be their merit. All are rare, in actual practice; and deservedly so; for none are of a favorable character. But any one of them is much preferable, at any time, to postponement of relief, and consequent disaster by extravasation; and all, too, are preferable to pushing a metallic catheter by sheer force through an impassably strictured urethra.

[*Through the Symphysis Pubis.*—This mode of puncture is recommended, and has been successfully practised by Dr. Leasure, of New Castle, Pa., and by Dr. Brandes, of Jersey. These gentlemen advocate their operation as simpler, more easily performed, more convenient, better adapted to many cases, and probably safer than either of the other methods. The patient may be placed erect against a wall, or recumbent on his back. A small incision is then made through the integuments, previously shaved, in front of the symphysis. This symphysis is next to be perforated at its upper third (Brandes), or at a point about three lines above the centre of the arch (Leasure), with a hydrocele trocar and its canula; these should be pointed obliquely downwards and backwards towards the promontory of the sacrum, varying the direction according to circumstances, and continuing a slightly boring motion, until resistance ceases and the urine begins to show itself. The trocar may then be withdrawn, and a flexible catheter introduced through the canula, to be retained *in situ*, with the patient in a prone position. (See Am. Jour. Med. Sci. April, 1854, p. 403, and July, 1854, p. 256; also London Lancet, April 15, 1854.)]

Extravasation of Urine.

This may be either vesical or urethral. The *Vesical*, as we have already seen, may follow wound, ulceration, or tearing of the viscus. 1. After the wound of lithotomy, it is too common; 2. Cystitis may lead to perforating ulcer; 3. Retention of urine may be relieved only by a bursting of the bladder, or by a more gradual giving way by ulceration. Actual laceration, however, is not uncommon; and it is not difficult to understand why. Cohesion of the parts has been previously diminished, by the inflammatory process occurring in them; and, themselves unusually lacerable, they are powerfully acted on not only by a hypertrophied detrusor, but also by the muscles of the abdominal parietes and the diaphragm. 4. The bladder may be lacerated by external injury; as by blows, or falls on hard substances, more especially when the viscus happens to be distended. The nature and treatment of the first form have already been considered. The second is hopeless; the patient will necessarily perish, by peritonitis, or by areolar infiltration and sloughing, according to the site of the urinous escape. In the third form—that occurring by unrelieved retention—there is but little hope; yet there is some room for treatment. During violent effort to overcome the obstacle to expulsion of urine, something is felt to yield, and relief is experienced and expressed; yet—probably to the patient's surprise—no urine is seen to come by the penis. By and by, the sense of relief and comfort passes off; burning heat is felt in the infiltrated part; and the constitutional symptoms attendant on asthenic inflammation and gangrene, which must follow, declare themselves in their most formidable shape, rapidly becoming more and more typhoid, and soon ending in fatal collapse.

Or, if the viscus have fortunately given way at its most anterior part, the local mischief may advance outwardly, and perhaps evacuation by the perineum may occur, with more or less relief. Treatment obviously consists in reaching the infiltrated part, if possible, by early, free, and dependent incision, and in maintaining the powers of the system, under the strong depressing agent so busily at work, by every means in our power. No case, in which an outward and efficient opening has been afforded, is to be considered too desperate. Nourishment and stimuli must be steadily administered. Unexpected and wonderful recoveries have rewarded perseverance.

Urethral Extravasation is more common, as a consequence of stricture. The urethra gives way, by ulceration, at some part of its course; and the bladder remains entire. There may not be the same sensation of something having yielded during straining; but there is, generally, the same temporary feeling of relief having been obtained. Soon, however, there is a painful undeceiving; the infiltrated parts become hot, swollen, red, black, dead; a urinous odor seems to exhale from the whole body, but more especially from the parts affected; and the ordinary typhoid irritation of system becomes more and more developed—low and rapid pulse, black tongue and mouth, sunk and anxious features, and clammy skin, hiccough, muttering, delirium.

The site and amount of local mischief depend on the part of the urethra which has given way. Not unfrequently, it is behind the bulb; and the urine, restrained, at least for a time, by the deep fascia, burrows deeply. In such a case, the local signs may be obscure; the scrotum being uninvolved, and the perineal swelling and discoloration at first indistinct. Should the glans penis be found swollen, hard, and blackening, it is a sign of the corpus spongiosum being infiltrated, and an omen of most sinister import. In such cases, an early and free incision, in the centre of the perineum, affords the only chance of relief and safety—the knife being pushed determinedly down, so as not merely to expose the surface of the infiltrated parts, but also to lay bare the source of extravasation.

When the giving way has occurred at a point anterior to the deep fascia, the case is more plain and less hazardous. The scrotum, and the integument of the penis, sometimes the inside of the thighs and the lower part of the abdominal parietes—not always the perineum—become rapidly swollen, and of a dark red hue; then the integument blackens, crepitates, and sloughs; and, as the sloughs separate, urine and fetid sanies flow away. Long before this open state, however, the olfactory organs alone are sufficient for diagnosis. In this case, the incisions do not require to extend so deeply, but are more numerous and extensive; leaving no part of the infiltrated textures without a free outward opening. Poultice and fomentation follow the knife; usually with active support of the system. In a day or two the poultice is superseded by water-dressing, and this again is medicated by the chlorides. Immediate hazard having been got over, and the parts having passed from [illegible], means are taken to overcome the cause of the accident, and to restore the urethra to its normal condition. In the great majority of cases, a tight stricture is found anterior to the site of ulceration.

But urinary irruption does not [illegible] take place directly from the urethra; urinous abscess may have formed, as the first result of the stricture; and then, the parietes of this abscess having yielded, extravasation takes place outwardly. The consequences and treatment are the same as in the direct and ordinary variety.

Injuries of the Bladder.

This viscus may suffer in various ways, by the hand of the surgeon. In lithotomy it may be unnecessarily cut, or bruised and torn by the forceps or scoop. In lithotripsy, it may be pinched, bruised, or torn, by a rash and inexperienced operator. By the catheter, too, it may sustain hurt. The risks are hemorrhage, and inflammation; to be obviated by the means already considered.

Not unfrequently, the bladder suffers by accident. The pelvis is broken; and a spiculum of bone, projecting inwards, is liable to penetrate the viscus, more especially if it happen to be distended with urine. Urinary infiltration can scarcely fail to occur; and probably to such an extent as to prove rapidly fatal. Or laceration may take place, in consequence of a blow or bruise; and it is well to remember, that this result may follow an application of violence apparently by no means great, if the bladder happen to be at the time full of urine. Blows, kicks, falls, have often proved thus fatal; and in the female it has occurred, from merely the superincumbent weight of another person. Ordinarily, however, the force applied is considerable. And unfortunately, the portion of the viscus which is most apt to give way is where it is covered by peritoneum, near its fundus; the outer coat, less extensile than the rest, is most apt to tear; and, besides, the force is likely to jam this part of the bladder on the promontory of the sacrum. There is great pain in the region; only a small quantity of urine comes by the urethra, and that is more or less mixed with blood; no tumor of distended bladder can be felt by the rectum or vagina; the catheter draws off but little fluid, and that is bloody; by and by the ordinary signs of urinary infiltration are declared.

If the tear has been extra-peritoneal, on the anterior aspect of the bladder, there is hope in the treatment. The urine may, in its infiltration, approach the surface in a somewhat limited way; timeous and free incision of the abdominal parietes may evacuate it, with sloughed areolar tissue; and the patient may be saved—even with complete return of the urine to its natural channel.[1]

When the injury affects that part of the bladder invested by peritoneum, the urine passes at once into the peritoneal cavity; and escape from death is hardly to be looked for. Still there is room for treatment. The catheter is introduced; no water will probably come, unless there has been penetration through the aperture in the bladder; but the instrument should be retained, with its point just within the neck of the bladder, so as to afford an outlet to what may be afterwards secreted. Should the patient survive for a day or two, it is possible—as dissection has shown—that by inflammatory agglutination of the abdominal contents, the general cavity of the abdominal peritoneum may be shut off from that of the pelvis; the latter becoming coated with lymph, like an abscess, and the urine confined there. Under such circumstances, it has been proposed to tap this cavity from the rectum, by means of the long and curved trocar.[1]

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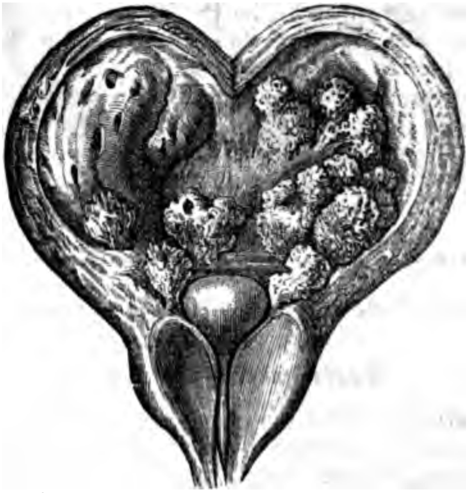
[1] Syme, Contributions to Surgery, p. 332.

In the parturient female the distended bladder is apt to suffer. By instruments in extraction of the fœtus, it may be torn; by long-continued pressure of the head of an impacted fœtus, it may be induced to slough or ulcerate; and vesico-vaginal fistula is the result—provided the patient recover.

Tumors of the Bladder.

Fortunately this is a rare affection. The interior of the viscus, however, is occasionally the seat of tumors; and these are of two kinds. Simple mucous polypi may form there, in considerable numbers; simulating the ordinary symptoms of stone. The sound finds no calculus, but may be felt impinging on a soft and movable substance, obviously extraneous to the bladder's coat. It has been proposed to deal with this by means of the lithontriptor; but the prospect of success does not seem very inviting.

Fig. 245.



[Polypous growths from the mucous membrane of the Bladder. (From Gross. Copied from Civiale.)]

Malignant tumors may form; medullary; growing from the coats of the viscus—usually near its neck, in apparent connection with the prostate—and occupying the cavity to a greater or less extent. Micturition is frequent and painful; and the pain is greatest immediately after the effort; the urine is bloody and fetid, and often contains flaky substances, or masses of the disorganized tumor; by impaction of these, occasional retention may occur; dull weight is felt in the loins; and the pain of micturition is much more pelvic, and more extensive there, than in the case of stone; also the sound, on encountering the foreign body, imparts quite a different sensation. There is no remedy for this disease. We can only hope to palliate, by opiates, and the recumbent posture. Sometimes the tumor, expanding, may cause retention which is not capable of being relieved by the catheter; and, in such circumstances, we are called upon to protract existence, by puncturing the bladder above the pubes.

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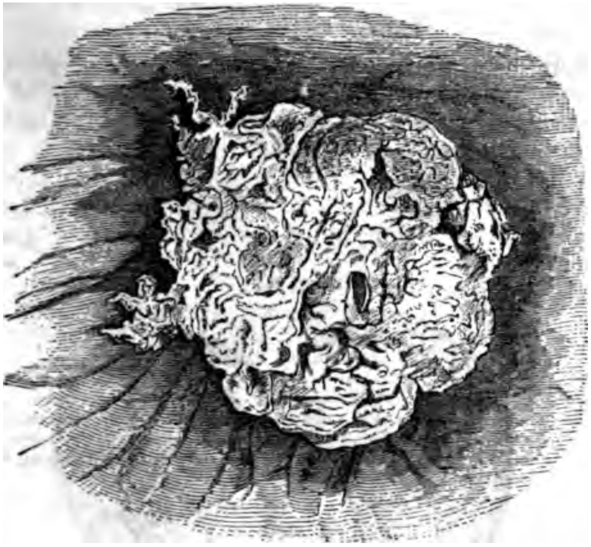
[1] Lancet, No. 1386, p. 352.

Cancerous disease may extend from the rectum to the bladder, involving all in one large and loathsome sore. Malignant tumors also form between the two viscera, as formerly stated. There is for such cases no cure.

Fig. 246.



[Drawing of a vascular, soft, spongy Tumor of the Fundus of the Bladder. (From Gross.)]

Displacement of the Bladder.

It has been already stated that sometimes, though rarely, the bladder is protruded, so as to constitute the contents of a hernial tumor. And displacements, too, of this organ, by pelvic abscess and tumors, are alluded to elsewhere.

Miserable cases are not very unfrequent, in which the anterior half of the bladder is congenitally defective, as well as the corresponding part of the abdominal walls; the mucous surface of the viscus becoming consequently protruded to constitute a red moist swelling, from which the ureters may be seen throwing out their fluid.[1] [Fig. 247.] These admit of mere palliation, by wearing mechanical contrivances adapted for protection and comfort. [Figs. 248, 249.] If the patient live to old age, the mucous coat is apt to become covered with vegetations, which, assuming malignancy, may fungate and bleed, and prove fatal.

It has also happened, in the female, that the bladder has been inverted and protruded through the urethra, forming a vascular-looking tumor between the labia.[1] Were this removed, under careless diagnosis, by

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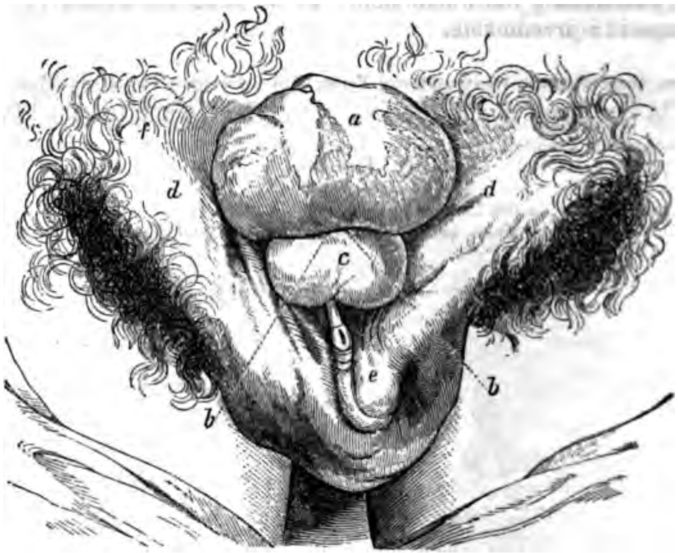
[1] Handyside, Edin. Medical and Surgical Journal.

Fig. 247.



[Case of congenital *Extrophy* of the Bladder—the anterior wall of the abdomen, and that also of the bladder being deficient. The patient was 19 years old when the drawing was taken. *a*, represents the bladder, its mucous membrane everted and protruded through the abnormal opening in the anterior wall of the abdomen, constituting a red, moist, soft, easily-bleeding, painful tumor. *b b*. Orifices of the ureters. *c*. Penis without urethra. *d d*. Symphysis pubis. *e*. Scrotum and testis. *f*. Congenital inguinal hernia. (Gross, *Diseases and Injuries of the Bladder*, &c. p. 98.)]

Fig. 248

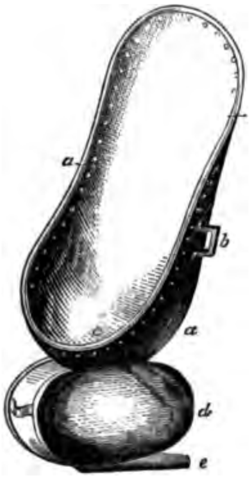
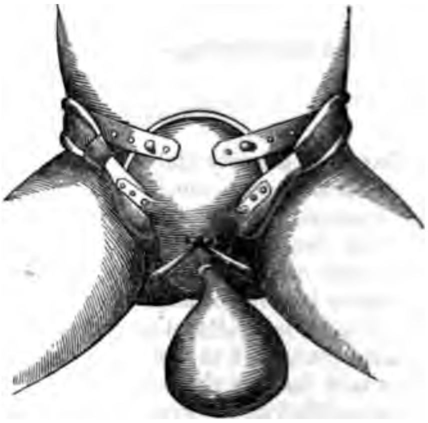


Fig. 249.



[Fig. 248. *a*, *a*. Shield for covering bladder and penis. *b*. Loop for securing apparatus around the body by means of a strap. *c*. Funnel. *d*. Reservoir. *e*. Tube for evacuating urine. (From Gross.)]

[Fig. 249. The shield and reservoir as applied. (From Gross.)]

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[1] Crosse, Trans. of Provincial Med. and Surg. Assoc. vol. ii, 1846; and Brit. and For. Rev. Oct. 1846, p. 319.

knife or ligature, the most serious consequences must ensue. The true nature of the case may be ascertained by discovering the orifices of the ureters, and finding the whole tumor to be reducible within the pelvis. Sometimes it is irreducible.

Laroche, Dissertation sur l'Hématurie, Paris, 1814. Chopart, Traité des Maladies des Voies Urinaires, Paris, 1821. C. Bell on Diseases of the Urethra, Bladder, &c., Lond. 1822. Howship on Diseases of the Urine and the Urinary Organs, Lond. 1823. Foot on Diseases of the Urethra and Bladder, Lond. 1826. Begin and Lallemand, Dict. de Méd. Prat. (art. *Hematurie*) t. ix, Paris, 1833. Coulson on Diseases of the Bladder and Prostate Gland, Lond. 1842. Guthrie on the Anatomy and Diseases of the Urinary Organs, Lond. 1843. Brodie, Lectures on Diseases of the Urinary Organs, Lond. 1849. [Civiale, Traité des Mal. des Organes Génito-Urinaires, Paris, 1851. Gross, Dis. of Urinary Organs, 2d ed. Philad. 1855.]

CHAPTER XXXII.

AFFECTIONS OF THE PROSTATE.

Prostatitis.

THE prostate is liable to be affected by an acute inflammatory process, during the progress of virulent gonorrhœa. And this may also be excited by direct injury of the part—as by a blow on the perineum, or rash use of instruments introduced by the urethra; by excessive venereal indulgence; by imprudent exposure to cold and wet; by sympathetic influence from affections of the rectum; by the internal use of cantharides, or other irritants. Heat and pain are complained of in the perineum, near the anus, and there is tenderness on pressure there; water is made frequently, and with pain; and pain is greatest as the accelerator muscles exert themselves to expel the last drops; there is a sensation of weight in the rectum; and that bowel is evacuated with both difficulty and pain; the finger introduced into the rectum ascertains the prostate to be large, hot, and tender on pressure; and an attempt to pass a catheter into the bladder is difficult and painful—the difficulty and pain occurring when the instrument's point has reached the prostatic region. Not improbably, the affection extends to the bladder, and then the ordinary symptoms of cystitis are added to those already described. Treatment is by rigid confinement to the recumbent posture, leeching of the perineum, hip-bath, fomentation, and opiate enemata or suppositories. Sometimes relief is obtained from large, warm, and emollient enemata, which may be supposed to act as a poultice applied directly to the part. Direct leeching has been proposed, by means of a tube, or speculum, introduced by the rectum; but it is probable that the irritation attendant on the application will more than counterbalance the benefit obtained by such abstraction of blood.

Abscess of the Prostate.

When the above symptoms sustain sudden aggravation, with rigor, increase of swelling, and tenderness in the perineum, greater difficulty of micturition, and greater swelling and tenderness on examination by the rectum, it may be presumed that matter is forming in the gland. Careful examination is made, in order to arrive at correct diagnosis; and as soon as fluctuation can be discovered, however obscurely, a direct incision is made by the perineum, to procure outward evacuation. If an artificial opening be delayed, the abscess may open into the urethra—favoring the formation of urinous abscess; or into the rectum, establishing a troublesome recto-vesical fistula; or outwardly by the perineum, after much injury has been done to the intervening tissues. Spontaneous evacuation into the urethra is indicated by copious purulent discharge from the penis. And then it is advisable to use a catheter, gently introduced, as often as may be necessary to empty the bladder—for some days—so as to prevent, if possible, untoward entrance of urine by the ulcerated aperture; or a soft elastic catheter may be passed and retained.

Chronic suppuration of the prostate has been observed, causing much distress, with discharge of muco-purulent urine. On examination by the rectum, a soft point has been felt in the gland; and, on pressing it, matter has escaped by the urethra. The plunge of a lancet or trocar, into the soft point, has given relief; and troublesome fistula has not followed.

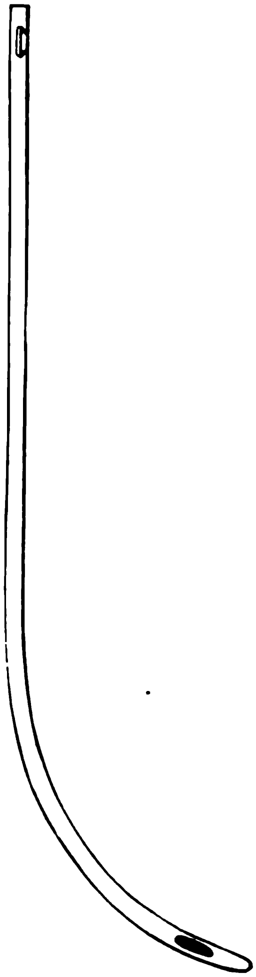
Simple Enlargement of the Prostate.

Simple enlargement of the prostate is of two kinds; one the result of chronic prostatitis; the other hypertrophy, independent of the inflammatory process; the one not uncommon in the adult of middle age, the other peculiar to advanced years. The former variety is dependent on stricture, or gleet, or affection of the rectum, or injury of the perineum by habitual horse exercise; and disappears, usually, on removal of its cause. If not, recumbency is to be maintained, a few leeches are applied to the perineum, these are followed by smart counter-irritation, and, at the same time, internal use of the iodide of potassium may be of service. The bowels are kept gently open, by simple laxatives and enemata. In obstinate cases, an alterative course of mercury is expedient; and, under this, amendment is sometimes both rapid and satisfactory.

Hypertrophy of the gland is usually regarded as but one of the many signs of senile degeneracy in the frame. As the eyes grow dim, the trunk bends, the cartilages ossify, and the arteries change in their coats —so the prostate is supposed to grow large and hard. The enlargement may be uniform, the whole gland seeming to expand equally; displacing the urethra as well as compressing it and consequently interfering with its function in regard to the urine. Or the central portion may enlarge, with greater rapidity than the rest of the gland; rising like a mammillary process; projecting backwards in the bladder; but, ever, and anon, liable to move forwards, and so to act as an occluding valve to the outlet of the cavity. In general, the lateral lobes enlarge unequally; and consequently a twist is given to the prostatic portion of the urethra, in the lateral as well as in the vertical direction.

The symptoms of this simple hypertrophy are—increasing slowness and difficulty in making water, uneasiness and difficulty in emptying the rectum, with a sensation of weight in that bowel and in the perineum; sometimes the fæces are passed flattened, as in stricture of the rectum. On introducing a catheter, some difficulty is likely to be met with in pass-

Fig. 250.



The ordinary catheter; of half size.

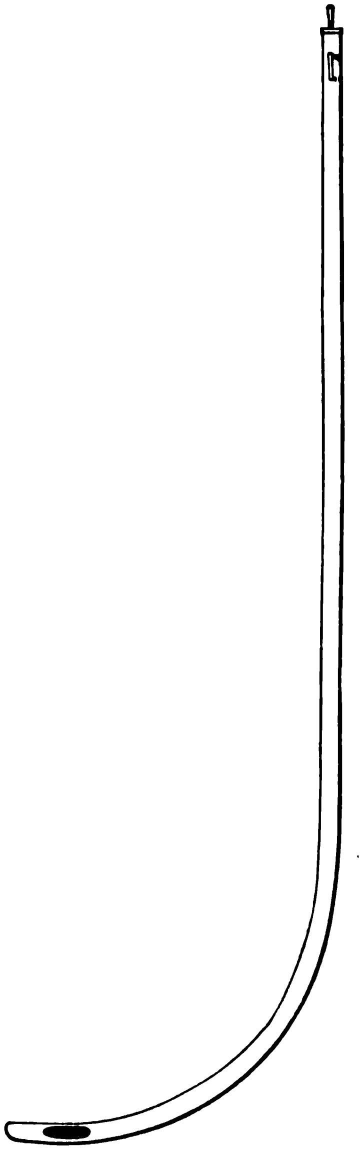
ing the region of the prostate; and when a finger in the rectum is made to press upwards on the catheter, the enlarged prostate is plainly felt between. Without the use of the catheter or bougie, tactile examination is never certain. As the tumor enlarges, calls to empty the bladder are more frequent, and the act is less perfectly accomplished; as formerly stated, a portion of residuary water remains, cooped up behind the enlargement. The bladder sympathizes; it may become irritable; more frequently, a degree of chronic cystitis is excited. The urine changes, in consequence; becoming dark-colored, fetid, and full of mucus. The vesical aspect of the projection may ulcerate, giving rise to hæmaturia, purulent urine, and aggravation of all the distress. The difficulty in micturition increases; and at last—some casualty acting as an exciting cause—retention occurs. Generally, this has not existed long, before the "surface water" comes to dribble away; and, by the establishment of incontinence, the retention is partially relieved, as formerly stated. It may happen, however, that the obstruction is complete; and by retention the patient may perish. Or, the whole urinary system having become involved in disease, death takes place by gradual exhaustion.

Treatment is but palliative. We can scarcely hope to retard, much less to remove the enlargement. Every excess and imprudence is avoided, in diet and exercise; and the recumbent posture is maintained as much as possible. The bowels are regulated by enemata and simple aperients. Opiates are given occasionally; and acids, iron, buchu, &c., are exhibited, as the complication by chronic cystitis may seem to demand. To avert distension of the bladder, the catheter is used as often as may seem necessary. Excision of the gland has been talked of; but scarcely in sober earnest.

When retention has occurred, the catheter requires a peculiarity of management. As already stated, the urethra is considerably elongated; and the catheter must be of proportional length. The prostatic portion of the urethra almost invariably has a bend given to it, antero-posteriorly—that is, the convexity is towards the rectum, the concavity towards the pubes; and to suit this peculiarity of form, the instrument should have a large curve. Very frequently, the central enlargement or "third lobe," as it is usually called—exists; and, to surmount it, it is well to have at least one instrument in the prostatic set, whose point makes a sharper curve upon the general bend. It is introduced carefully; and, to assist the point onwards, the handle is freely depressed after passing the triangular ligament; while, at the same time, the point is elevated by means of the finger in the rectum. If the silver catheter, thus made and managed, refuse to enter, one of elastic-gum may be tried; bent to the proper shape, and introduced with the stilet. On reaching the prostatic obstruction, the stilet is gently withdrawn, while the catheter is pushed steadily on, and the consequent elevation of the point may perhaps lead it over the obstruction. Or, the stilet being held steady, the tube is passed on, and the same effect is produced—the catheter's point curving round that of the stilet, as it were.

There is another peculiarity. As the prostate enlarges, not only is the prostatic portion of the urethra unusually extended and curved; it is also very considerably enlarged, by dilatation of the prostatic sinuses on each side of the verumontanum.[1] In retention, this dilatation is usually full of urine; in fact may be considered as a small accessory bladder in front of the real one. On the catheter reaching it, a spoonful or two of urine may be discharged, and the surgeon may in consequence be led to suppose that he has reached the bladder and emptied it, and that the remaining swelling consists of abscess; the plunge of a trocar may follow; or the patient may be left to his fate, unrelieved. But by invariably using the long catheter, in such cases, and never resting satisfied until this instrument is passed *tenus capulo*—unless, indeed, water flow freely, without such extreme insertion—the surgeon is safe from all such serious error.

Fig. 251.



The prostatic catheter: of half size.

Perhaps the prostatic obstruction proves insurmountable. Then the bladder must be relieved at all hazards; and one or other of the following methods may be adopted:—The catheter may be forced through the obstruction; guided in a good direction by the finger in the rectum. Or a trocar and canula may be used, instead of the catheter. Or the bladder may be punctured above the pubes. The operation by the rectum is obviously unsuitable.

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[1] Deschamps, Traité de la Taille, tom. i, p. 222.

Of these proceedings, perforation of the prostatic obstruction is the most advisable, by means of a suitable trocar and canula; the latter of the same length and calibre as a full-sized prostatic catheter, but considerably less curved. It is passed carefully on to the obstruction, with its trocar withdrawn, and with its extremity temporarily occupied with a bulbous wire; and, when satisfied by the finger in the rectum, that the instrument is duly directed towards the bladder, the bulbous wire is removed, the trocar is inserted and protruded, and the whole is pushed on. The trocar is then wholly withdrawn; and the canula is retained for some days. When the retention has been of long duration, and there is reason to believe that the kidneys are organically diseased, the urine is to be withdrawn gradually, for the reasons formerly adduced.

Malignant Disease of the Prostate.

The gland is sometimes, though rarely, the seat of scirrhus. More frequently it is affected by medullary formation, which enlarges rapidly, ulcerates, bleeds, and follows the usual course of such tumors. The disease is not peculiar to the aged. It may occur in children, as medullary tumors in other sites so frequently do. The symptoms are similar to those of mere ordinary enlargement, with the addition of those of tumors in the bladder, as well as of those which attend and characterize all malignant formations. The disease is incurable. By opiates, the catheter, enemata, and rest, we may hope to palliate and protract.

Deschamps, Traité sur la Taille, tom. i, Paris, 1796. Home, Everard, Practical Observations on the Diseases of the Prostate Gland, Lond. 1811. Lawrence, Lectures in the Lancet. 1829–30, vol. ii. Coulson on Diseases of the Bladder and Prostate Gland, Lond. 1843, Brodie on Diseases of the Urinary Organs, Lond. 1849. Adams on the Anatomy and Diseases of the Prostate Gland, Lond. 1851. [Civiale, Op. citat.; Gross, Op. citat.]

CHAPTER XXXIII.

THE VENEREAL DISEASE.

history of the venereal disease is involved in some obscurity. r, it seems extremely probable—if not, indeed, quite certain— ections of the genital organs, dependent on licentious venereal rse, have existed from the earliest ages; that they have pre- various degrees of frequency and intensity, at different times ces; that they were not directly imported from America to by Columbus's followers, in the end of the fifteenth century; but tween the years 1493 and 1495—at the time of the siege of —they experienced an aggravation in Europe, and consequently d much more prominently the attention of the profession.

are usually spoken of under the general term of "the Venereal ;" and this again is divided into Gonorrhœa and Syphilis; both lt of the application of animal virus, engendered by illicit inter- or at least communicated thereby; the former an inflammatory of the urethra; the latter a contamination of the whole system, l by the formation of pustular ulceration on some part of the r other part of the body. By some, it is still maintained that ons are the same; that what produces gonorrhœa is capable of syphilis, and *vice versa*. The weight of authority, however, erates largely in favor of an opposite opinion; admitting, perhaps, orrhœal virus is capable of causing the simplest form, only, of ulcer; and even that concession is by many not granted.

Gonorrhœa.

ute inflammatory process seizes on the lining membrane of the part of the urethra; caused by the application of gonorrhœal from a second party; and this application usually made during tercourse. There is a period of incubation, of uncertain ex- scharge may show itself within not many hours after connec- it may not be till after many days have elapsed. About the may be taken as the average period of accession. Heat and re felt in the glans, which seems fuller and more deeply colored al; the urethral orifice is uneasy, red, and swollen; urine is n a small stream, sometimes forked, and with increasing heat rting; the orifice of the urethra shows an increased secretion; ecomes dry, more red and swollen, and painful; the stream of urine is more diminished, and the pain which accompanies it is intense; then discharge returns—no longer limpid, but turbid and puriform—becoming more and more profuse, and ultimately seeming to consist of true pus; and if the disease prove intense, there may be a considerable admixture of blood. Sometimes smart fever affects the system; sometimes there is but little constitutional disturbance. The thighs, loins, and testicles sympathize in a dull aching sensation.

Such are the ordinary symptoms at the onset of the disease. But, in the course of its progress, serious additions may be made. 1. *Chordee may occur;* that is, abnormal erection may take place; the penis becoming bent like a bow—forming an arc of which the urethra is the chord—the convexity on the dorsal aspect—probably on account of exudation having taken place into the corpus spongiosum, so as to prevent uniform expansion of the erectile apparatus. Such erection is intensely painful, and tends to aggravate the disease; it is also liable to induce profuse hemorrhage, probably by laceration of the mucous membrane. The tendency to chordee is greatest during sleep; while the patient is warm in bed, and perhaps excited by voluptuous dreams. Sometimes, its proximate cause would seem to be other than plastic exudation; normal and abnormal erections alternating with each other. 2. *The glans may become excoriated,* furnishing a profuse discharge; establishing what is termed spurious gonorrhœa. 3. *The prepuce may become œdematous;* inducing the condition of Phimosis, when the swollen prepuce maintains its ordinary relation to the glans; causing Paraphimosis, when it is reflected behind the glans, and allowed to remain there. The former state aggravates the disease, by retaining discharge, and increasing the tendency to affection of the glans; the latter leads to strangulation of the glans, and consequently to intense exacerbation there. 4. *The lymphatics may suffer;* becoming painful, red, and swollen, on the dorsum of the penis; or, without such indication, inflammatory enlargement may take place in the inguinal glands, constituting what is termed Sympathetic Bubo. 5. *Abscess may form in the penis;* on the dorsum; or beneath, opposite to the lacuna maxima. The latter is the more frequent site. A main residence of the inflammatory process—which, in the first instance, does not extend beyond two inches from the orifice—seems to be in this lacuna; which swells and becomes hard; filled with accumulated secretion internally, and externally invested by plastic exudation. In this exterior true inflammation may occur, causing abscess of greater or less extent. 6. *Or abscess forms in the perineum,* at a distance from the original site of the disease—a less frequent complication; threatening retention of urine by compression of the urethra, and urinous abscess by opening internally. 7. *Or prostatitis ensues;* sometimes by continuous extension of the inflammatory process along the membrane; more frequently, perhaps, by metastasis. And in severe cases—either originally and innately so, or become urgent in consequence of either mal-practice, or imprudence on the part of the patient—abscess may form in the prostate; usually superficial, as regards the urethra; temporarily causing retention of urine; early emptying itself internally, and rendering urinous abscess not improbable. 8. Or, the inflammatory process extends still further, and more untowardly—either by continuity, or by metastasis; and *acute cystitis results;* aggravating all the local symptoms, and by urgent disorder of the system, bringing even life into peril. From the bladder—with or without abscess of that organ—inflammation has extended to the peritoneum, and proved fatal. 9. *Acute rheumatism may supervene;* the joints of the limbs becoming painful and swollen, and the system suffering under inflammatory fever. The knee and ankle-joints are those most frequently and prominently involved. The supervention sometimes takes place during the acute stage, sometimes during the decline; occasionally the rheumatic symptoms are coeval with those of the gonorrhœa. Or gouty symptoms may be excited, in those of the better ranks, and of advanced years. 10. Very often, in protracted cases, *orchitis takes place;* the inflammatory process sometimes seeming to be transferred to the testicle by metastasis, sometimes seeming to creep along from the posterior part of the urethra to the vas deferens, and thence to be extended to the epididymis and testicle—becoming mainly resident in the former. During the acute stage of such orchitis, urethral discharge diminishes, and may wholly disappear; not necessarily proving a metastasis, but explicable quite on the principle of relief by counter-irritation. As the orchitis declines, discharge usually reappears.

Orchitis may be caused at any period of the case, by a blow on the part, or by imprudence in exercise. If spontaneous in its accession, it usually occurs in the chronic stage; weeks, perhaps, after the first appearance of discharge.

Gonorrhœa is one of those affections which are capable of self-cure. The intensity of the symptoms gradually subsides; the complications which may have occurred are recovered from, and the discharge becomes less copious, and somewhat restored to the mucous character. This state is termed a *Gleet*—embers of the previous burning. There is little or no pain, swelling, or redness; thin discharge is the prominent symptom; with, perhaps, some trouble in micturition. In a patient who has suffered from previous claps, a greater or less degree of contraction in the urethra probably exists; but, in primary attacks, the gleet need not be suspected of such complication. In any case it is not to be considered that the gonorrhœa has finally ceased—becoming merged in an affection of a different name and kind; for, from but a slight cause—as unusual exercise, imprudence in diet, or such like—reaccession of the inflammatory process may take place; and the gonorrhœa may be revived in even more than its pristine severity.

The *Treatment* of gonorrhœa varies, according to the stage of advancement. At the first onset, what is termed the ectrotic or abortive treatment may be attempted; while the inflammatory process is still nascent, and has not reached the suppurative crisis. The nitrate of silver is used, as in similar affections of the surface: with the view of procuring rapid resolution (*Principles*, 4th Am. Ed. p. 158). It is applied, in the form of strong solution, to the affected part of the mucous membrane—carefully, by means of a glass syringe, so as to pervade the whole diseased surface. Some prefer the form of ointment.[1] A coagulated film is produced, which, adhering, protects the villous surface beneath during the passing of urine; besides, the purely antiphlogistic effect of the remedy may be obtained, here, as in erythema; and, not improbably, a third beneficial indication may be fulfilled—the virus may be chemically acted on and neutralized. Such injection or application is made once or twice—at an interval of twelve or twenty-four hours; and strict rest, with antiphlogistic regimen, is observed.[1] The affection may be arrested, resolution may rapidly follow, the virus may be destroyed, and the disease may thus be cut short in its outset. Obviously, however, such treatment is applicable only to the very earliest stage—which is seldom brought under the cognizance of the surgeon; in irritable habits it is not likely to succeed; and under even the most favorable circumstances, there is always a risk of failure, with consequent aggravation of the original disease.

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[1] ʒi to ℥i of lard. The strength of the injection may vary from fifteen to thirty grains in the ounce of distilled water.

Failing the ectrotic attempt—or, no opportunity having occurred for its practice—the acute or inflammatory stage is met by ordinary antiphlogistic means. And it is well to remember, in reference to this, that the first attack of gonorrhœa is generally the most severe. Rest is enjoined; but, for obvious reasons, this all-important indication is but seldom fulfilled—and hence one cause of this affection often proving tedious and troublesome in its cure. Diet is low; the part is fomented, and by a handkerchief or bandage it is suspended; antimony is given in nauseating doses; the bowels are gently moved; drastic purging does harm, by irritating the rectum, and involving the urethra in sympathy; leeches may be applied to the perineum; and, if uneasy feelings pervade the hips, loins, and thighs, the hip-bath will be found useful. In extreme cases, it may be necessary even to abstract blood from the arm. To mitigate the ardor urinæ, bland fluids are drunk, abundantly; as linseed tea, a solution of mucilage, &c. To render the urine less acrid, saline draughts are useful; as, a scruple of bicarbonate of soda, with a drachm of rochelle salt, dissolved in tepid water, and then mixed with soda water; taken three or four times daily. Bland enemata are useful, in regulating the bowels; and, in the case of a sympathizing prostate, they are of service as a fomentation or poultice to that part. The antimony is of use, not only as antiphlogistic, but also as antaphrodisiac; and this latter indication is to be assisted by suitable moral treatment on the part of the patient. Camphor, too, and lupulin, are useful in the same way. Should painful erections occur, opiates are given, especially at bedtime; a pill of opium, hyoscyamus, and camphor, is found to be very suitable; repeated as circumstances may demand. And the patient should lie cool at night, with few bed-clothes. Sometimes full doses of colchicum are of service, in relieving chordee—especially in those cases which possess the rheumatic complication. Leeching of the affected part is not advisable; the leech-bites are likely to cause swelling, partly by ecchymosis, partly by œdema; and such swelling tends to complication by phimosis or paraphimosis; besides, the wounds are liable to be inoculated by the virus, and troublesome sores may be the consequence.

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[1] Some employ the nitrate of silver in another way, for ectrosis; using a weak solution—say two grains to eight ounces of water—and injecting this once every four hours, for ten or twelve times. We would put more faith in the concentrated and less frequent form of application.

At this stage, ectrotic treatment is not to be thought of. We would not seek for sudden suppression of discharge, were this in our power. If it do occur, it is an untoward event; sure to be followed either by aggravation of the original disorder, or by implication of the prostate, bladder, or testicle, through metastasis. Strong injection, therefore, is not suitable. No doubt, it may temporarily arrest the discharge, but only because such exacerbation of the inflammatory process has taken place as checks all secretion; pain, swelling, and redness are greater than before; and discharge soon reappears in increased quantity.

The inflammatory crisis having passed over, the sternness of the antiphlogistic treatment is gradually departed from. And certain remedies are given,[1] which by experience are found to exert a specific influence on the urethra; copaiba and cubebs; the former the more suitable at first; given in cautious doses, lest a deleterious amount of stimulus be imparted to the membrane.

As the case becomes chronic, antiphlogistics are gradually abandoned. And, for the state of congestion which remains in the membrane, the direct application of gentle stimuli is found useful. Pressure may be applied, by a compress over the corpus spongiosum; but this is found irksome, and difficult of management. The method of injection is preferable. A glass syringe, with blunt point, and long narrow nozzle, is employed; by means of which—inserted fully into the urethra—application of the injected fluid may be made accurately to the whole diseased surface. Backward extension to the bladder need not be apprehended, the natural collapsed condition of the canal being a sufficient obstacle to this. The fluid injected is at first weak; and its strength is gradually increased, according to circumstances. In nothing is there more room for variety. Some use an infusion of green tea, or other vegetable astringent. Sulphate of zinc is perhaps most commonly employed; or the acetate of zinc; or sulphate of copper; or the salts of iron; or the nitrate of silver; or alum; or strychnine. A favorite injection is the acetate of zinc, with a proportion of opium. Water is passed before injecting, so that the fluid may reach the membrane directly; and, on withdrawing the syringe, the point of the penis is held erect for some time, so as to keep the fluid in contact with the affected part. The operation may be repeated three or four times in the day; but should over-excitement ensue, injection must be wholly discontinued for a time; and when resumed, it must be very cautiously. As already stated, the strength of the injection is gradually increased; and, if it seem to have lost its influence, it is better to change to a different kind, than to increase the first to a strength at all formidable. In fact, the principle of stimulation is conducted as in the use of lotions to a weak sore on the surface of the body (*Principles*, 4th Am. Ed. p. 213). In obstinate cases, benefit may be derived from nitrate of silver rubbed on the perineum, so as to act as a smart counter-irritant.

In the truly chronic stage, large doses of cubebs may be given with advantage; regard always being had to the kidneys, lest over-stimulation occur there. And sometimes rapid amendment may be obtained by cubebs combined with copaiba in the form of paste, given in wafer paper—an admirable remedy for the chronic cases, but usually much too stimulant for the early stage. These internal remedies may be employed along with injection. Or they may be alternated. But, in no case, should injection be long and continuously persevered with; otherwise a discharge of the stimulant's own production may be maintained, keeping up a state of congestion in the membrane, delaying the cure, and rendering the occurrence of stricture very probable.

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[1] These remedies act on the part; as is shown by experiment. If a patient with fistula in perineo have contracted gonorrhœa, and if the whole urine be permitted to pass through the fistula, no benefit will accrue from any dosing with cubebs or copaiba. But when, by shutting up the abnormal aperture temporarily, the urine is made to pass over the whole urethra, amendment is at once observed.

Sometimes the affection is chronic from the first; passive congestion furnishing the discharge. This is liable to occur in patients of sluggish temperament, who have had many attacks of the disease. In such cases, antiphlogistics are never suitable; and the stimulant mode of treatment is adopted from the first.

The casualties of the disease are met as they occur. Chordee requires cool covering of the parts at night, a suitable moral treatment, and sedatives. The attack, when spasmodic, may be moderated by immersion of the organ in cold water. Hemorrhage often requires no treatment, being regarded as a salutary occurrence, auxiliary in the cure; if excessive, it may be restrained by the application of cold, or by pressure, as already described. Œdema is relieved by fomentation and poultices. Bubo requires fomentation and rest; and, its first acuteness over, external application of iodine is likely to obtain resolution. Abscess threatening in the penis, or in the perineum, is opposed by increased and concentrated antiphlogistics; if matter have formed, an incision cannot be made too early for evacuation. Affections of the prostate and bladder require their suitable treatment, already noticed. Small cold enemata, containing a moderate quantity of laudanum, are sometimes very useful. And it is well to avoid these attacks, by doing nothing heroically, in the way of injection, after the gonorrhœa is fairly established. With some, no doubt, strong injections are still in vogue, even at an advanced period of the case. But, in our opinion, they are warrantable only at the very first, as already stated; and then should consist only of nitrate of silver—which alone seems capable of exerting a purely antiphlogistic influence on skin and mucous membrane. It is used here, as in inflammatory affection of the mucous membrane of the throat; it forms a protecting crust, allays irritability, and resolves the inflammatory process. The same strength of sulphate of zinc would prove merely stimulant, and would not fail to cause aggravation. Gout and rheumatism are met by their peculiar treatment. And, obviously, it is important to remove the tendency to uric deposit as speedily as possible; otherwise the passing of this cannot fail to maintain, and probably to increase the urethral excitement.

Thus, according to the ordinary principles of surgery, would we treat gonorrhœa; and with a good hope of success; if the indications regarding regimen and rest be fully carried out—a difficulty in many cases, as already stated. But there is no disguising the fact, that not unfrequently the disease proves quite intractable; as if determined to run its own course, regardless of the means employed—unchecked, almost unmitigated and unmodified. In such cases, some peculiarity of constitution will generally be discovered; scrofula, gout, or extreme irritability of system. And for such difficulties, no general rules of treatment can be laid down. Each must be met by what seems most suitable under the circumstances; always avoiding undue activity of practice; and preferring rather that the disease should run its own course, than that by unfortunate interference more serious affections of the prostate, bladder, testicle, or general system, should be induced.[1] In general a tonic treatment is required; specially the preparations of iron and quinine; with the latter, nux vomica has been successfully combined.[2]

Bougies are by some recommended; but we would move them altogether from gonorrhœa to gleet. Their use in the former affection is extremely apt to over-stimulate, causing reaccession of the disease. In gleet, however, they are very serviceable, by obviating any tendency to contraction in the urethra, and removing the congested state of the lining membrane; and sometimes by means of a bougie, the citrine or some other stimulant ointment may be beneficially applied to the anterior part of the membrane. In obstinate cases, with irritability of the posterior part of the canal, nitrate of silver may be applied—cautiously—by means of Lallemand's porte-caustique.

In some cases of obstinate gleet, the discharge seems to be kept up by chronic prostatitis, and to come from the follicles of the gland. Under such circumstances, Chian turpentine, in five-grain doses, often arrests the secretion; seeming to have a special action on these parts.[3]

After discharge has ceased, and uneasy sensations have almost wholly disappeared, great care is still necessary on the part of the patient. Cure is not yet complete. A hearty meal, a debauch in wine, venereal indulgence, a long walk or ride, may reinduce the discharge and pain. Avoidance of all such re-exciting causes, therefore, must be scrupulously observed, until at least a week has elapsed.

As to the period when contagion ceases, opinions differ. Probably, the discharge is most virulent when first displayed—as yet non-purulent in character. Perhaps, as the purulent character is declared, virulence may decrease, and soon disappear. Possibly, the creamy thick discharge may be not different, in any respect, from the ordinary product of simple inflammation. But such matters are, as yet, not fully removed from uncertainty; and it is well always to approach error on the safer side; holding for practical purposes, that so long as there is discharge, there is at least a possibility of communicating infection thereby.

Sometimes the eyes suffer by gonorrhœa; and one of two affections may occur. *Gonorrhœal Ophthalmia* includes Conjunctivitis and Iritis. Gonorrhœal Conjunctivitis, as formerly noticed, is usually the result of direct contagion; virulent gonorrhœal matter having been applied from a second party. The inflammatory process is rapid and intense; and the most active measures are necessary, to prevent serious structural change. Gonorrhœal iritis, on the other hand, is a remote constitutional result of the virus within the patient himself; occurring as a secondary symptom; usually mild in its character, and demanding no severity of treatment. It most frequently occurs in those of a rheumatic habit; and is not unlikely to be associated with affections of the joints. Often it is accompanied with corneitis.

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[1] The length of time during which an obstinate gonorrhœa may persist is sometimes great; but scarcely so extreme as that mentioned by one eminent modern authority, who gravely tells us of claps contracted at the peace of Amiens in 1800, being still running in 1840!—Lancet, No. 1263, p. 510.

[2] Brit. and For. Rev. July, 1850, p. 226.

[3] Adams on Diseases of the Prostate, p. 35.

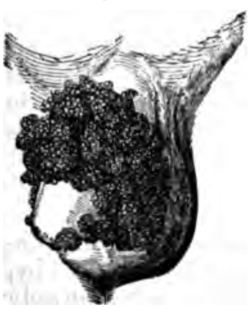
Secondary symptoms, of any kind, are rare. Sometimes, however, a febrile disturbance is followed by papular eruption; and *Gonorrhœal Lichen* is said to be established. This, too, is mild. Under anti-febrile measures, the precursory disorder soon yields; and the eruption will not resist simple and ordinary treatment. Like the primary affection, it is capable of self-cure; and may often be medicinally disregarded. Mercury is never necessary. The virus of gonorrhœa is comparatively mild; its seat would seem to be much more in the part than in the system; and when the latter is involved, it is but slightly.

In some constitutions, there is intolerance of copaiba; its use being followed by the appearance of an eruption, of the nature of urticaria, preceded and accompanied by smart constitutional disturbance. Discontinuance of the remedy, with antiphlogistic regimen, is enough.

Gonorrhœa Præputialis, sometimes termed *Spurious Gonorrhœa*, but more correctly *Balanitis*, denotes a condition of the preputial membrane and investment of the glans, similar to that of the urethral lining in gonorrhœa. The disease may be an accession to gonorrhœa; or it may occur independently of this, from the same cause. Or it may be altogether simple in its origin; resulting from accumulation of acrid secretion, from retention of calculous matter, or from external injury. The part is red, swollen, partially abraded by superficial ulceration, and discharges a profuse puriform secretion. The prepuce is œdematous; and there is more or less trouble in micturition. Treatment is simple. An ectrotic result by nitrate of silver is almost always in our power. The glans, having been exposed, is pencilled lightly over by nitrate of silver in substance, or, what is better, by a strong solution of it. Within four-and-twenty hours, the intensity of the inflammatory process, and the amount of secretion, will be found greatly diminished. And, very probably, another application will complete the cure. Of course, rest and antiphlogistic regimen are not neglected.

Warts are a frequent concomitant of the foregoing affection; or they may form independently of it. They are usually clustered round the corona glandis, and on the frænum (*Principles*, 4th Am. Ed. p. 356). The best method of removing them is to take away the projecting portions by knife or scissors, and then to touch the stools with an escharotic; the nitrate of silver, firmly applied, may prove sufficiently powerful; or some one of the other suitable destructives may be used—as bichloride of mercury, dissolved in alcohol, ʒi to ℥i; equal parts of savine powder, and burnt alum; acetic acid; or a strong infusion of tormentilla officinalis.

Fig. 252.



Warts on the penis.

A more genuine form of *Spurious Gonorrhœa* occurs, when, from some cause, other than the pplication of gonorrhœal matter, inflammation is kindled in the anterior art of the urethra, and furnishes discharge. The inflammatory process s common; not specific. The symptoms are comparatively mild; and heir duration is short. Ordinary antiphlogistics suffice for cure. The ore common exciting causes of such an affection are—the internal use f cantharides, or other irritants; the application of acrid female secreions in marital intercourse; injury done by instruments, or by the passng of calculous fragments; external injury of any kind; sympathy with he rectum, or with an irritated state of the whole intestinal cânal.

Gonorrhœa in the Female.

The female suffers comparatively little from Gonorrhœa. For a few ays only the acute symptoms persist; and the chronic stage is attended ith but little discomfort. The parts affected are the urethra, as in the ale, the vulva and exterior of the vagina, and the os uteri; the lastentioned part frequently becoming affected by superficial ulceration. ometimes the inguinal glands enlarge sympathetically. The promient symptoms are—discharge, painful micturition, pain and swelling in he vulva, œdema of the præputium clitoridis, uneasiness in sitting and alking; at first, some constitutional disturbance; often an aching in he back and loins. Treatment is simple. At the outset, an ectrotic esult may be obtained; the vulva being painted over by nitrate of ilver. Failing this—during the short acute stage, recumbency is enoined, with antiphlogistic regimen; the parts are diligently fomented; nd, if need be, demulcents are given freely. Afterwards injections are o be used, of greater strength than in the male—the pelvis being eleated during and for some time after injection, so as to prevent premaure escape of the fluid; and a piece of lint, soaked in the stimulant olution, may be kept constantly retained in the vulva. Gallic acid may e useful, internally. And, ultimately, a tonic system of general treatent may be expedient.

Young girls are liable to suffer from a spurious gonorrhœa, caused by ome intestinal, rectal, vesical, or general irritation; and consisting of n excited and perhaps excoriated state of the vulva and orifice of the agina, with discharge. It yields readily to removal of the cause, folowed by the simplest local treatment. A knowledge of its nature and rigin is obviously of much importance, in a medico-legal point of view.

The true gonorrhœa is apt to be confounded with Leucorrhœa; but ay generally be distinguished, by attention to the history of the case, nd its accompaniments; also remembering that in gonorrhœa there is esical and urethral disorder, with tendency to glandular irritation in he groins, while in leucorrhœa these affections are comparatively unommon.

SYPHILIS.

This includes, as a general term, all the diseased states, local and constitutional, primary and subsequent, which follow, and are caused by, he inoculation of venereal poison. The action of poisons has already een considered (*Principles*, 4th Am. Ed. p. 571); as well as the probability that there is here a double process of zymosis. The virus, settling on and in the part, accumulates there, and at the same time excites an inflammatory process, soon ending in true inflammation; and this always causes suppuration and ulceration—sometimes sloughing. This constitutes the *Primary* or *Local symptoms.* From the specific sore, thus produced, absorption takes place, after the acute crisis of inflammation has passed (*Principles*, 4th Am. Ed. pp. 100, 128). And, by absorption, the virus enters the system, through the circulation; more or less rapidly, and in greater or less quantity. In the system, a second zymotic process is established; the poison is multiplied; and, acting perniciously on the frame, it declares itself by fever and eruption—these constituting the *Secondary* or *Constitutional symptoms.* By such an outbreak, the poison may be fully eliminated; and, if so, then the disease is at an end. If, however, elimination is incomplete, then other affections—of bone, skin, and mucous membrane—make their appearance at a still more remote date; and these are termed *Tertiary symptoms.*

The venereal ulcers, or primary sores, are of different kinds; and these different kinds are liable to be followed by corresponding variety in the secondary symptoms. Hence it has been inferred, that there are varieties in the originating virus—that there is a plurality of poisons. At present, the question is involved in much uncertainty. But for practical purposes, it is sufficient for us to know, that all venereal sores are not alike in their characters, progress, and results; that at least four different varieties exist, and can readily be discriminated; and that each of these requires some peculiarity of treatment.

But, in the first place, it is important to observe, that all sores of the penis are not venereal; and, further, that all sores of the penis, caused by impure sexual intercourse, are not necessarily the product of a specific virus. The penis is as liable as other parts to ordinary causes of the common inflammatory process; and common sores may result. Again, it is liable to be excoriated during coition; and a sore may form in consequence, quite unconnected with inoculation of any virus. And, also, the part is liable to herpetic eruptions, of quite a simple nature.

Herpes of the penis usually occurs on the integuments of the body of the organ; sometimes it forms on the preputial lining, behind the glans. It may be caused by the contact of acrid female secretions—not virulent; or its accession may be altogether unconnected with sexual intercourse. It is known by the character of the vesicles; their plurality, form, speedy formation, and early disappearance. Rest, cooling medicine, and some simple soothing application, constitute the necessary treatment. Patients once affected by it are very liable to its recurrence.

Simple Abrasion is known by its immediate appearance, by absence of the preliminary inflammatory process of pustular formation, by its superficial extent and irregularity of form, by the absence of true ulceration, and by speedy assumption of the healing process. It heals under ordinary simple means.

Common sores are known by the history of their production, and by absence of the characteristics of the venereal ulcer. If any doubt exist it is expedient to treat the sore, locally, as if it were really venereal. Thus all risk, by mistake, is averted from the patient. And, if it be considered of importance to arrive at certainty on the subject, the test by inoculation may be had recourse to. A portion of discharge from the sore is inserted, by the point of a lancet, in the inside of the thigh; if the virus be present, a succession of results will occur as in the case of other inoculations; active congestion will form, then pustular formation, and then ulcer. By the third day the characteristics will be sufficiently plain.[1] And then, by freely rooting out the forming pustule by means of an escharotic, propagation of the disease is prevented.

I.—*The Simple Venereal Ulcer.*

If previous excoriation, or other breach of surface exist, the sore may declare itself at once; the incipient inflammatory process becoming apparent almost immediately after connection. More frequently the virus has to find its way through entire skin or mucous membrane. And a day or two, consequently, may be occupied by a period of incubation—ranging from one to ten, or more.[2] Then the inflammatory process, causing pustular formation and ulcer, advances, as already stated; ulceration being generally established by the sixth day from the time of infection. The progress may be conveniently divided into three stages. *First*, that of inflammatory accession and pustular formation. Redness forms, with itching and heat; in the centre of the redness, visication takes place; the contents of the vesicle become purulent, constituting a pustule; this breaks, with or without scabbing, and discloses an acute ulcer beneath. The *second* period is that of ulceration; occupying, also, it may be said, from three to ten days. The advancing sore is usually of a circular or oval form, excavated, of pale surface, surrounded by a bright inflammatory areola, and furnishing a thin ichorous discharge. This is the period of infection, inoculation, and arrest by cauterization. The thin ichorous discharge, not yet truly purulent, is certainly most charged with the virus, and consequently most likely to propagate the disease by contagion. It is now that the most favorable opportunity exists for attempting the test by inoculation—if such be desired. And it is only at the early part of this period, that we have it in our power, by converting all into an instant slough, to extirpate the disease while it is yet wholly local. The *third* stage is that of reparation; the sore speedily showing the characters of the weak class. (*Principles*, 4th Am. Ed. p. 212.) Tall, pale, and flabby granulations sprout up, above the level of the surrounding parts; and the vascular areola diminishes, in both extent and intensity. In this state the sore may remain stationary for many days. But on the healing process being begun, a *fourth* stage may be said to be in progress—that of cicatrization.[3]

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[1] For detail of the results of venereal inoculation, see Ricord, Lancet, No. 1278, p. 225.

[2] There seems good reason to suppose, that in general the virus begins to act very soon after its application; within a few hours, in most cases; and that the examples of apparently protracted incubation depend, chiefly, on the circumstances of the poison having been temporarily intercepted, as it were, by a hair follicle, a hardened portion of cuticle, or other obstruction.

[3] On the glans there is little or no reparative action by organization of new material

The negative signs by which this sore is distinguished, are: the absence of surrounding induration, no elevation of the edges, and no tendency to phagedæna. Its ordinary site is on the prepuce, and in the sulcus behind the corona glandis; often by the side of the frænum; occurring, in short, in the parts most susceptible of, and most exposed to contagion, and where the virus is most likely to nestle, overlooked.

All sores near the frænum are unfavorably situated. The second stage is of long duration, and ulceration is acute; the sore continues to enlarge; often it burrows beneath the frænum, causing perforation; and reparation seldom advances, until the frænum has been wholly destroyed. In all such cases, therefore, it is well to abbreviate the process, by division of the frænum at once; care being taken that troublesome hemorrhage do not ensue, from the small but active artery which generally shows itself at the time of incision.

In treatment, early application is of the greatest importance. For it is only during the first few days, that we can be certain of success in the ectrotic attempt. Some authorities extend the favorable opportunity to the sixth day, from the first symptom of infection; and some include the whole period of the second or ulcerative stage. All seem agreed that, within the first three or four days from the application of the exciting cause,[1] it is certainly in our power to root out the disease; "punching it out," as it were; converting the poisoned ulcer into a simple sore; and preserving the system quite untainted. For this purpose, an escharotic is freely applied; nitrate of silver—or, what is more certain, the potassa fusa—pointed, inserted accurately within the sore and pressed there firmly; the fluid exudation being wiped up, as it threatens to overflow. Water-dressing is applied, until the eschar separates; and then the surface beneath is anxiously scanned. If it present the characters of a simple and healthy sore, water-dressing is continued, and healing advances. If, however, the tawny surface and angry appearance of a still virulent ulcer show themselves, the escharotic is reapplied. And such repetition is carried out, from time to time, until a satisfactory clearing has been obtained. If profuse and offensive discharge exist, it may be well to medicate the water-dressing, from the first, or by one or other of the chlorides.

The healing process having begun, simple water-dressing should not in general be long continued; for, sores on the penis, even of a simple nature, tend speedily to the characters of the weak sore. Early medication, by zinc or otherwise, is accordingly required. If, notwithstanding, the granulations threaten exuberance, there is no better plan than to touch the elevated surface, every second day, with the nitrate of silver, lightly; applying water-dressing intermediately. During the treatment, rest is of the greatest importance; and the organ should also be suspended by a handkerchief or bandage.

If the case be seen too late to admit of ectrotic treatment, the sore being in the third or reparative stage, the application of nitrate of silver is still useful; by subduing the exuberant granulations, and expediting

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whatever kind of sore exist; consequently there the cicatrix is always depressed, and loss of substance is permanent.

[1] Ricord guarantees immunity if ectrotic treatment have been thoroughly applied within the first four days from the application of the virus.

the healing process. We cannot now save the system from contamination; absorption having already been busy. But we may diminish the amount of taint, by shortening the period during which absorption takes place; and, besides, the nitrate may probably act decomposingly on the remaining local virus. Experience tells us, that the more speedily the sore is healed, the less is the likelihood of the occurrence of secondary symptoms.

Warts are not an unfrequent complication. They are subject to the same treatment, and are of the same nature, as those which attend on gonorrhœa.

The secondary symptoms which occur, at a period of from three to six weeks after infection,—if the ectrotic attempt have failed, or have not been practised,—are usually either exanthematous or papular; venereal roseola, or venereal lichen. The eruption is preceded by fever, and is accompanied by an affection of the throat, similar to what attends other eruptions of the same class. The tonsils, and fauces in general, are red, raw, swollen, and painful; sometimes invested by an aphthous coating; sometimes superficially abraded. The eruption is chiefly situated on the trunk, more especially on the back and belly; but the face and limbs are not exempt. Sometimes there is mere discoloration of the skin, in numerous faint spots.

A patient having begun to complain, at the ordinary time of accession, of such symptoms of general disorder as usually usher in the secondary symptoms, it is our object to favor an early and full appearance of the eruption; for, thus the febrile condition will be relieved, and what seems the natural effort towards extrusion of the poison from the system will be assisted. To check the skin affection, were as unwise as to attempt repression of the eruptions of measles, small-pox, or scarlatina. The bowels are generally acted on, and a warm bath is given. Regimen is antiphlogistic, and confinement to the house is enjoined. Antimony is given, with more than one object in view: it tends to moderate fever, at the same time determining to the skin; and there is good reason to believe, that it is also an auxiliary of no mean power in elimination of the virus. The eruption, having attained its acmé, gradually fades. At the same time, the affection of the throat recedes; but, in general, amendment here may be expedited by use of the nitrate of silver. By warm bathing, restriction of diet, avoidance of exposure and general attention to the skin—iodide of potassium, sarsaparilla, or other alteratives, being given if necessary—purity of the surface is restored; and the cure is complete. It is seldom that the more decided but more dangerous alterative, mercury, requires to be had recourse to. Its sparing exhibition—only as an alterative—is expedient, however, when the eruption either proves obstinate in its first attack, or tends to sundry recurrences, under the ordinary treatment. Tertiary symptoms need not be dreaded.

II.—*The Ulcer with Elevated Edges.*

In this—a compound of the irritable and inflamed sores, of the general surface (*Principles*, 4th Am. Ed. pp. 223, 225)—the reparative stage is late; not occurring until at least two or three weeks have elapsed. The excavated surface is of a brownish hue; and the edges are elevated, not only above this raw surface, but also above the surrounding parts. There is no surrounding induration, and there is no phagedæna; but, sometimes, the ulceration is acute and rapid; destroying the parts, by persistence of acute inflammation, almost as formidably as if by phagedæna—more especially if the sore be situated near the frænum. Treatment is the same as for the former class of sore. But, if the healing process be obstinately deferred—in cases too late for ectrotic treatment—mercury may be cautiously administered; a blue pill, or a pill of iodide of mercury, being given, night and morning, until the characters of the sore show amendment. Even this cautious dose, however, is not expedient, until the more simple and safe means have been fairly tried and found ineffectual.

The partially irritable is liable to pass into the thoroughly inflamed sore, here as elsewhere. In such circumstances, all escharotic or otherwise irritant applications must be abstained from, until, by the ordinary means, the inordinate inflammatory process has been subdued. In the irritable condition, the oxide of silver is sometimes of use, in the form of ointment.

If the ectrotic attempt have failed, the occurrence of secondary symptoms is extremely probable. Antecedent febrile disturbance is more considerable than in the first class of cases; and the eruption is usually of either the papular or pustular character—more frequently the latter. The pustules are chiefly situated on the chest, back, and face; occasionally they degenerate into irritable sores; but the majority fade, and heal by incrustation. Their site is marked by brownish discoloration, sometimes of obstinate persistence. Bubo is not unlikely to occur, more especially if the patient fail to observe recumbency; the lymphatic enlargement not, in general, dependent on a common inflammatory process, excited by simple irritation on the penis—as in the case of gonorrhœa, or simple abrasion, or herpes—but on a specific inflammatory process, caused by propagation of the virus from the original site, and lodgment of it in the ganglia. Iritis, too, may occur, constituting a serious complication. Affection of the throat is tolerably severe; and the tonsils may display extensive aphthous ulceration.

The secondary eruptions require the same general treatment as those which follow the first class of sore. Bubo is treated by rest, fomentation, &c.—perhaps by leeching. Iritis demands its own peculiar management, formerly detailed. Only in the slightest forms, dare mercury be withheld. Its exhibition here is not anti-syphilitic, but antiphlogistic; and it is managed accordingly. The throat requires soothing by inhalation, in the first instance; afterwards, the nitrate of silver, in substance or in strong solution, applied every second day, will remove irritability in the breach of surface, and expedite cicatrization. If either the throat or the skin affection prove chronic and obstinate; or if, after deceptive disappearance, reaccession occurs—mercury may be given, sparingly; rather, however, as a last resource, than as an ordinary part of the treatment. Antimony and the iodide of potassium, with attention to hygiene, prove sufficient in the greater number of cases.

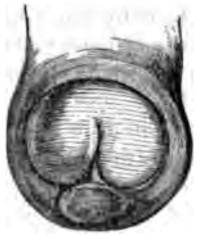
A troublesome sore sometimes forms on the orifice of the urethra; and it generally is of this class. Constantly exposed to irritation, by the passing of urine, it is slow to heal; it may, by persistence of ulceration, cause considerable loss of substance; and then cicatrization cannot occur, without producing more or less contraction of the urethra at that part. Hence, it is obviously of great importance to detect its presence early, and to make sure of the ectrotic treatment. During the subsequent healing, light application of the nitrate of silver is very suitable; this forming an adherent incrustation, protective of the parts beneath. And this production may be further aided, by the temporary application of an oiled piece of lint, on each margin of the orifice during micturition.

Sores sometimes form more within the urethra; causing much trouble, by pain, swelling, discharge, and liability to constitutional sequelæ; and rendering the occurrence of troublesome stricture all but inevitable.[1] They are treated by injections, carefully introduced so as to insure their application to the sore; and of such a kind as would be applied to the ulcer in an ordinary site. After cicatrization, the occasional use of a bougie is expedient, to obviate the tendency to contraction of the canal.

III.—*The Hunterian, or True Chancre.*

This belongs to the indolent class of sores; but, unlike those on the general surface of the body, is usually indurated from the first. The antecedent inflammatory process is chronic, accompanied by copious plastic exudation, around and beneath the forming sore; giving an almost cartilaginous hardness to its base and margin, which feel as if a split pea had been inserted into the textures. The sore is circular, and excavated; the surface of a tawny or brownish hue, seems as if recently scooped out by an instrument; reparative action is faint, and long delayed; sometimes, the site of granulation is occupied by a thin, ash-colored, adherent pellicle. There is no surrounding vascular areola, after the sore has fairly formed. The ordinary sites are the glans penis, the preputial reflection, and the integument of the body of the organ; the first the most frequent, and showing greatest induration. While other kinds of sore may occur in one or two places, this form is in general solitary.

Fig. 253.



A venereal sore on a common site. The characters are chiefly those of the Hunterian chancre.—After Acton.

Treatment is based on the same principles as that of the preceding varieties. Not only the sore, but also the callous induration around and beneath—in which, it is probable, the virus mainly resides—must be destroyed; and for this purpose no weaker caustic than the potassa fusa is necessary—freely applied, perhaps with repetition. Neither is it enough merely to obtain cicatrization, leaving the hardened base and margin but little altered, if at all. These, constituting essential parts of the disease, must be got rid of. And if, after repeated use of the escharotic, hardness still remain, then removal by discussion is to be sought; by internal means—mercury, or the iodide of potassium; and also by the local application of these substances. It is better that some further contamination of the system, by rapid and final absorption, should be risked, than that the part should remain a constant zymotic source of propagation. And discussion may be expected by the application of pressure, when the sore is so situate as to admit of this; a piece of folded lint being placed over the part, and retained by an elastic band.[1]

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[1] The presence of such concealed sores in connection with gonorrhœa, probably, gave rise to the belief that gonorrhœal matter had the power of producing syphilis.

It may happen, that early and free use of the potass thoroughly succeeds in obtaining the ectrotic result; the sore completely changing its character, and healing up, without risk of secondary symptoms. More frequently, however, we fail in this; probably from being too late in our interference; and the sore refuses to change under local means alone. Then mercury is necessary; given with more freedom than in any of the former cases, though still with caution; never pushing it to excess of ptyalism, and always ceasing from the administration, at least for a time, so soon as amendment seems fairly begun in the sore. It is invariably our object to accomplish the desired end, at as little cost of the mineral as possible.

When the ectrotic attempt fails, as is not unlikely, secondary symptoms are almost certain to occur. The eruption is scarcely preceded by fever, and is unaccompanied by it. Faint, brownish spots, or *maculæ*, appear—chiefly on the trunk; or, as more frequently happens, an eruption of copper-colored blotches occurs, and these subsequently become scaly—evincing the characters either of lepra or of psoriasis. As the primary sore is considered the true *Chancre*, so the constitutional affection may be termed true *Syphilis* or *Pox.*[2] The throat is involved; but, as in the other symptoms, this shows but a dull amount of inflammation. One or both tonsils are found occupied by deep ulceration; often there is a sore on each, of characters very similar to those of the primary ulcer. For such affections of the system, there is no remedy equal to mercury; and it seems generally agreed that, when true syphilis has declared itself, the cautious use of that mineral should be immediately begun. No heroic dosings are necessary, however; an alterative course is still all that is required; continued till amendment appear; and perhaps revived, at intervals, until final clearance of the poison has been effected. Bubo and iritis, if they occur, are met by their appropriate treatment; in the latter affection, mercurialization may be conducted with especial freedom—for a marked tolerance of the remedy will certainly be found.

If the primary and secondary symptoms have not been actively and conclusively dealt with, tertiary symptoms are extremely probable; showing themselves after the lapse of some months. The periosteum of the bones which are most exposed—tibiæ, ulnæ, clavicles, cranium, sternum—suffers by a chronic inflammatory process; and the bones themselves are similarly involved; creating the condition of Node (*Principles*, 4th Am. Ed. p. 364), sometimes circumscribed and acute, more frequently chronic and diffuse. The joints, too, are affected with chronic swelling and pain. Fetid, ill-conditioned sores, may form between the toes. Condylomata may appear on the nates and perineum. Irritable sores may form on various parts of the general surface. The glands of the neck may be chronically enlarged; especially behind the ears. The testicles may swell; either solid, or with serum in the tunica vaginalis. The throat may again become attacked by ulceration—of a more diffuse and acute character; the palate may be involved, and exfoliation may ensue. And one or both groins may be occupied by indolent bubo. The more ordinary of the tertiary symptoms, however, when mercury has not been abused, are the ostitic and periostitic affections. And for these, as well as for the tertiary symptoms in general, iodide of potassium is found to be the preferable remedy; begun in full doses, and regulated according to the effects produced. Eight grains, thrice daily, in solution, is a justly favorite form of exhibition; diminished when the physiological effects are threatened to be produced.

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[1] Acton, Lancet, No. 1226, p. 220.

[2] By many the term "chancre" is employed to denote all kinds of venereal sore; as "cancer" is often made to comprehend all kinds of malignant disease. When a special meaning is intended to be affixed to "chancre," however, it is understood to include only this fourth class of sore.

There is a modification of this class of sore, consisting of induration merely. A callosity forms, after impure intercourse; and it may, or may not ulcerate, at a late period. It is equally prone to contaminate the system as the true chancre; and requires precisely similar treatment. Cure is not complete, so long as any degree of hardness remains.

It is not to be forgotten that this form of disease may be simulated, by sores unconnected with venereal virus. From accidental circumstances, induration may occur here as elsewhere; indolent characters superseding the weak in an ordinary breach of surface. Or, again, a venereal sore, originally of the first or simple class, may become indurated, in consequence of frequent and unnecessary use of caustic, or from other sources of irritation. Such simulations, of course, warrant neither the prognosis nor the treatment of true chancre.

IV.—*The Phagedænic Ulcer, the Sloughing Ulcer, and the Sloughing Phagedæna.*

Phagedæna, here as elsewhere (*Principles*, 4th Am. Ed. pp. 225–230), may be either acute or chronic. The latter is not very formidable; being as it were, only a degree more troublesome than the worst forms of the second class of sore. Its most common site is the root of the glans; but, not unfrequently, it burrows from this, beneath the fascia of the penis, producing much induration and swelling of the organ, with copious fetid discharge; advancing unseen and unchecked, till much mischief is done; probably opening into the urethra, at one or more points; at all events laying the foundation of tedious sinus, with perhaps a permanently enfeebled and abnormal state of the organ. Sometimes, also, this form of sore attacks the posterior part of the dorsum of the penis, and burrows beneath the pubes.

Acute phagedæna, the sloughing sore, and the sloughing phagedæna, present the same characters here as elsewhere; attacking the glans and prepuce indiscriminately; and in a short time effecting the most destructive ravages. The accession and progress of the sore, or sores, are accompanied with marked constitutional disturbance, of the nature of irritative fever, tending manifestly to prostration. The sinister characters may declare themselves from the first; or, for a day or two, the sore may seem but an unusually foul and active sample of the second class, attended with an unusual amount of constitutional disturbance; and then, without any apparent exciting cause, rapid aggravation takes place, in both the local and constitutional symptoms; constituting what is ordinarily termed the "black pox." Sometimes such aggravation would seem to be accelerated, if not caused, by imprudent administration of mercury. And sometimes mercurialism would seem to have the effect of converting an originally simple sore, of the first or second class, into a tolerably close imitation of this of the fourth. It is important, however, to discriminate between the sore originally of a bad kind, and that which, by casualty, has become temporarily occupied by a slough; for, the suitable treatment is very different. Active and painful local management is required in the one; rest and simple antiphlogistics are sufficient for the other.

Fig. 254.

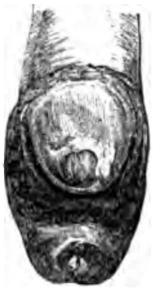

Fig. 255.

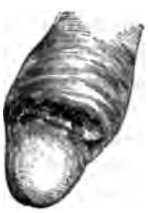

Fig. 256.

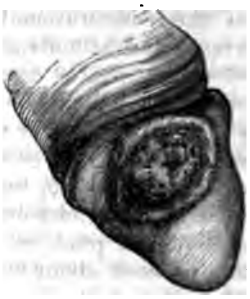

Fig. 254. The sloughing sore, as affecting the penis. The prepuce almost gone; the glans going. (Acton.)
Fig. 255. Acute phagedæna, burrowing beneath the integuments of the penis. (Acton.)
Fig. 256. Chronic phagedæna; with surrounding hardness, almost equal to that of true chancre. (Acton.)

As the disease advances, constitutional disturbance increases proportionally; and this, becoming decidedly typhoid, may prove fatal. Or it may be assisted by hemorrhage. Moderate loss of blood, however, may have an opposite effect, in the less urgent cases; occurring in quantity sufficient to affect the part, resolutively; and not to such an extent as to affect the system, depressingly. In most cases, a fatal result may be avoided; but, in many, serious mutilation is inevitable. The disease, fortunately, is comparatively rare; and is chiefly found in maritime towns, where by sailors and the lowest class of prostitutes sexual vice is extravagantly perpetrated.[1]

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[1] "Most of the young creatures who are brought from that genteel place, Swan Alley, afflicted with phagedænic ulceration, have had very little wholesome food; they are generally kept by Jews and Jewesses, who give them plenty of gin, though but little proper nourishment; they are half starved, and, more or less, in a continued state of excitement and intoxication, having connection with Lascars, and other dirty foreign seamen, as many times in the day as there are hours. In this manner, their constitutions must soon get into a very disadvantageous state for the favorable progress of any disease whatever; and we cannot wonder that their impaired and imperfectly developed frames, their course of life and uncleanliness, should promote phagedænic ulceration, and give it an unusually severe character."—S. COOPER.

To change the character of chronic phagedæna, no local application is so powerful as the fluid nitrate of mercury; diluted, so as to have an alterative rather than an escharotic effect. The primæ viæ are attended to; regimen is antiphlogistic; warm bathing is useful; and strict rest is enjoined.

Acute phagedæna, the sloughing phagedæna, and the sloughing sore, require the active treatment, locally and generally, suitable to this form of disease in general; the clearing out of the primæ viæ, followed by sedatives and anodynes; the stern use of an active escharotic, the characteristic moisture of the sore having first been removed; strict rest, and an antiphlogistic regimen; but, at the same time, a careful watching of the constitutional symptoms, lest typhoid tendency suddenly supervene, and stimulants become indispensable. Cover the part in a poultice, treating the case expectantly, as is the manner of some; and serious mutilation will be the probable result.

In the outset of an urgent case, one is tempted to imitate nature, and abstract blood. But, generally speaking, the experiment is a rash one; it may irreparably depress the system. While, however, bleeding from the system is unwarrantable, abstraction of blood may sometimes be made from the part, safely and well. A pendulous, half-dead portion of prepuce, soon about to slough wholly, may be cut off by the stroke of a bistoury; and bleeding from the wound may be encouraged, to such an extent as may be deemed suitable and safe.

Sometimes paraphimosis occurs; as can be readily understood, on account of the swollen state of the parts. This must be instantly remedied by replacement, if possible; if not, a free, liberating incision should be made on the dorsum of the penis, at the constricted part; otherwise, the progress of destruction cannot fail to be frightfully aggravated. After the acute stage is over, the internal use of iron may sometimes be employed with much benefit.

After cicatrization has been completed, it may be in our power partially to remedy the damage done, by closing abnormal apertures in the urethra by means of autoplasty.

Mercury is never advisable. Persistence of the febrile disturbance is itself a sufficient contra-indication. Besides, experience plainly tells us, that its local effect is to accelerate sloughing and phagedæna; seeming to favor the softening and undoing of organized structure, and so fitting it for ulceration, while tendency to this is already excessive.

Obviously, in such cases, ectrotic treatment is not always within our power. The local disease may spread too rapidly to permit isolation of the virus, with extirpation of the affected part; at the same time, however, the very acuteness of the inflammation is unfavorable to absorption; and, consequently, the occurrence of secondary symptoms is not so frequent as might otherwise have been expected. When they do occur, their accession is preceded by serious constitutional disturbance, similar to what attended on the local symptoms, but generally less urgent. The eruption may be pustular; the pustules large rather than numerous, giving way, crusting, and degenerating into foul sores of either the inflamed or irritable characters. Or it may be vesicular; large flat bullæ forming, with contents at first serous, but afterwards purulent;

giving way, crusting, and forming unhealthy sores beneath. Or it may be tubercular; broad tubercles forming, which enlarge and suppurate slowly, ultimately degenerating into loathsome and extensive sores. The throat is the seat of asthenic inflammation; ulceration quickly forms, and spreads both in width and depth—by sloughing, by phagedæna, or by both. One or other of the large vessels in the neighborhood of the tonsil may be opened into, and fatal hemorrhage may ensue. The larynx may be involved; ulceration actually extending to it; or œdema, preceding the ulceration, may cause most urgent symptoms. Either event may prove fatal. Bubo is seldom absent, at some period of the case. And when, by suppuration, an opening has taken place, this is apt to assume the same characters as the primary sore, by this time, perhaps, the gland being itself the residence of the same poison—by absorption and zymosis.

The treatment of these symptoms is fraught with much anxiety. Still mercury is withheld. It would but aggravate. Regimen is antiphlogistic; and antimony is given guardedly—so as not to prostrate; in many cases, it is well to combine it with gentle opiates. Warm bathing is grateful, and may relieve the febrile disturbance. Evacuants are obviously calculated to be of service; acting on skin, bowels, and kidneys; yet still not so as to cause prostration. The sores on the surface are cleaned and calmed, by poultice or water-dressing; afterwards they are dressed with nitrate of silver, chloride of soda, or other lotion. The fauces are diligently fomented by inhalation; the sores are touched with nitrate of silver in substance, or with the fluid nitrate of mercury slightly diluted;[1] and, after the acute stage has passed, benefit will accrue from moderate counter-irritation. Then diet is gradually amended; and when all has passed into the chronic stage, much advantage may result from judicious use of the iodide of potassium. Should iritis occur, a serious difficulty is engendered. We wish to give mercury to save the eye; and we at the same time wish to withhold it, to save the constitution. At first we trust, therefore, to smart loss of blood from the neighborhood of the part, and to the substitution of turpentine for mercury as the specific internal remedy. Only after this has failed, are we driven to a cautious use of the mineral.

The tertiary symptoms which may follow this form of disease, are of a formidable character; more especially if mercury have been given. Bones are liable to ostitis, and its highest results,—abscess, ulcer, caries, necrosis. Tubercles form on the skin, larger, more painful, and degenerating into worse sores than those of the secondary class; often crusting prominently, and assuming the characters of Rupia. Obstinate sarcoceles and hydrosarcoceles form. The throat is liable to be again attacked; in a more chronic, but very obstinate ulceration; with the same risk by hemorrhage; and with the additional risk of ghastly deformity, by involvement of the bones of the palate and nose.

It is in this form associated with a strumous tendency of system, and maltreated by the false mineral specific, that deformity and death are most likely to occur. But, happily, both of these untoward events are nowadays rare. Modern treatment does not aggravate, if it fail to cure. It consists in ordinary attention to the general functions, with careful regimen—not low but temperate; and in the administration of sarsaparilla, guaiac, or other simple alteratives, so long as febrile excitement, or stomachic and intestinal derangement, may remain. The primæ viæ having rallied, and febrile disorder having ceased, the iodide of potassium is brought into play, internally; and is patiently persevered with—hygiene, meanwhile, being not neglected. In obstinate cases, the "liquor hydriodatis arsenici et hydrargyri" may be of service.

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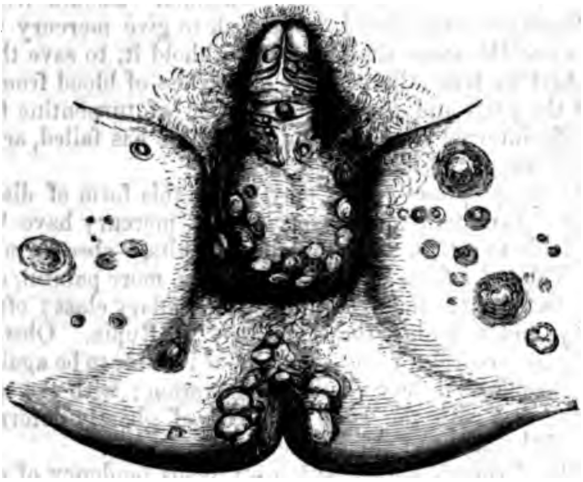
[1] In touching the throat with nitric acid, or fluid nitrate of mercury, of any strength, great care must be taken to avoid redundancy of liquid in the sponge or lint with which the application is made; otherwise, a drop may fall down, and, alighting on or in the glottis, may cause the most alarming dyspnœa.

Condyloma.

Condylomata are excrescences of the integument; sometimes white, sometimes of a mucous appearance; sometimes dry, sometimes exhaling a thin discharge: forming on the nates, around the anus, in the folds of the thighs, on the perineum, on the scrotum—in the female on the labia. They occupy a doubtful place in the arrangement of primary, secondary, and tertiary symptoms. And there seems little doubt that they are occasionally to be found, pertaining to all the three classes. Discharge trickling from primary sores—more especially from the true chancre—and accumulating filthily in the neighboring folds of integument, doubtless produces such irritation, and probably inoculation, as may lead to condylomatous formation; and this may then be regarded as partly of a secondary and partly of a primary character. Condylomata may also show themselves along with ordinary secondary symptoms; though this is rare. Again—months after the primary attack, and after a secondary train of symptoms, too, have run their course—condylomata may

Fig. 257.



Condylomata. (Acton.)

appear, for the first time, among the tertiary symptoms; and this is most frequently observed after true chancre. Besides, there is no reason to doubt that, not unfrequently, condyloma forms as the primary and only form of infection; whether communicated by a distinct variety of poison, or not, we are not at present in a position to determine.

To the primary condyloma a peculiar kind of constitutional affection succeeds. An "exanthematous eruption of a mottled appearance, and of a red or brownish color, occurs; sometimes preceded by vesication or scaliness, but never by pustules; sometimes elevated," and approaching to the tubercular character. The throat is raw and painful; and, on the mucous surface of the lips, cheeks, palatine arches, and tonsils, "peculiar, white, elevated patches are found; having the appearance of parts touched with the nitrate of silver, or coated with milk; irregular in form, and presenting occasionally superficial ulcerations on their surface."[1] By some it is supposed that this affection is identical with "sibbens;" which at one time used to prevail much in this country.

The treatment of condyloma consists in repeated applications of sulphate of copper, nitrate of silver, or more active escharotics, until the excrescences disappear;[2] in rectification of the primæ viæ; and in the internal use of iodide of potassium. The affection of the throat and mouth is treated with nitrate of silver, in substance or solution, applied every second day. The internal remedies—it is to be understood—are required only for the constitutional symptoms. Primary condyloma is removable by local treatment—perhaps ectrotic—in the same way as any primary sore.

Bubo.

Venereal Bubo, like Condyloma, is with difficulty appropriated to a class; for it, too, may be found of primary, secondary, and tertiary occurrence. It is a question whether or not bubo may be truly a primary form of syphilis; occurring without the formation of sores, of any kind, on any part of the penis; capable of producing venereal sores, by inoculation of the matter which forms by its earliest suppuration; and liable to be followed by constitutional pox. The probability is that bubo is never thus "*d'emblée;*" and that it is always the result, more or less remote, of venereal ulcer; the consequence, sometimes, of simple extension of the inflammatory process along the lymphatics; more frequently arising from angeioleucitis, not only induced but maintained by the virus—which may become resident and accumulated within the affected glands. In gonorrhœa, sympathetic bubo is probably the consequence of simple excitement. Inguinal swelling may, indeed, precede the appearance of discharge; the very first part of the inflammatory process having proved a sufficient stimulus to the lymphatics.

True bubo, as it may be termed, is the product of virus proceeding from a venereal sore; and usually occurs after the ulcerative stage of the sore has ceased, when absorption is busily resumed. But at any period bubo may occur, through exercise, debauchery in drink, or other folly on the part of the patient; occasioned then—if at an early period of the case—by mere extension of the inflammatory process; at a remote period, partly by this, and partly by evil working of the absorbed poison.

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[1] Skae, Northern Journal of Medicine, April, 1844.

[2] Sometimes dusting with calomel is of service.

Bubo of the Penis is said to exist, when the lymphatics on the dorsum are continuously affected by inflammatory disease; and when—usually about the middle of the organ—painful swelling takes place, with much induration; the inflammatory process having thrown out a large amount of plastic deposit, and threatening to advance to central suppuration. Pus generally forms; and may at once be evacuated externally, or may burrow extensively beneath the fascia. Treatment is by rest, leeching, and fomentation, in acute cases. Subacute swelling may be discussed, by external application of the iodide of potassium in solution. When suppuration has taken place, early evacuation is practised; more especially if retention of urine have threatened to occur.

Inguinal Bubo affects the upper cluster of glands; and this is a prominent characteristic of venereal affection, in contradistinction to inguinal enlargement in consequence of common sores, or other source of simple irritation, on the thigh, leg, or toes; in which latter case, the swelling will be found beneath Poupart's ligament. The tumor may be small or great; chronic, subacute, or acute; indolent or hastening to suppuration. The acute varieties, prone to suppurate, are those which follow directly on the primary sore; the chronic and indolent range themselves rather with the secondary and tertiary symptoms; the acute form often affects but one ganglion; the chronic frequently implicates the whole cluster; in suppuration of the acute, matter generally is first formed in the areolar tissue exterior to the gland; if the chronic slowly come to matter, gradual softening and suppuration take place in the interior, and may originate at more points than one. To such swellings, the ordinary principles of surgery are applied; not always, however, with a satisfactory result. Were the acute bubo dependent on simple excitement, or on mere extension of a simple inflammatory process, it would doubtless often yield readily to rest, leeching, and fomentation. But such is not the case; leeching is found to have but little effect in retarding the onward progress; and this is to be explained, by the active presence of venereal virus within the part itself—just as antiphlogistics would have but little effect in retarding the formation of the primary pustule and sore. Loss of blood, therefore, may in most cases be abstained from; rest, fomentation, poultice, and antimonials are employed; and, when matter forms, this is evacuated. And perhaps it is well that suppuration and evacuation should occur; there being a tendency thereby towards elimination of virus. Should matter form only between the enlarged gland and the skin, it is advisable to insure suppuration of the former, by penetrating its interior by potass introduced through the external wound—after the acute stage is over; otherwise, the cure will be tedious and imperfect, and, obviously, little or nothing will be done towards elimination. Under subsequent poultice and water-dressing, the swelling may only partially subside: and in such circumstances discussion of the indolent tumor is to be obtained, by the application of pressure by means of a compress and bandage. Sometimes matter is secreted at different times, and in different sites; and, in consequence, sinuses are apt to form. Then a sufficient opening is afforded to each collection, and pressure is applied; if this fail, the sinuses are to be laid open by the bistoury. Very frequently, however, pressure, good diet, and the iodide of potassium internally, suffice. If, along with bubo, the primary sores still exist, it is obviously an indispensable duty to soothe these, and obtain cicatrization as soon as possible. An open bubo, attacked by sloughing or phagedæna, receives the ordinary treatment applicable to such a state.

The subacute bubo may be discussed; by rest, low diet, and external use of the iodide of potassium, followed by gradually increased pressure. Or, if this fail, a blister may be applied, in the hope of thereby either promoting resolution, or accelerating a satisfactory suppuration.

The indolent bubo may almost always be discussed; by pressure or blistering—the former usually preferable—rest, good diet, and internal use of the iodide. If an undoubted connection exist with the third class of sore, a powerful alterative is necessary; mercury, in moderate doses. If matter form, it does so slowly and imperfectly; and blistering may be useful, in hastening the general disorganization of the swelling which is then desirable. Often, to complete this, free use of potass is necessary; destroying undermined integument, and breaking up obstinate indurations of the glands.

Special modes of treatment have been thought advisable in venereal bubo; as for example, by the local use of corrosive sublimate, and severe pressure. The preponderating weight of authority, however, would seem to be in favor of but little departure from the ordinary rules of simple surgery.

In taking a general view of the Venereal Disease, it is obviously resolvable into two great divisions—Local and Constitutional Pox.

I. *Local or Primary Syphilis.*—This consists of some variety of sore; sometimes of condyloma. It is transmissible to a second party, by contact and by inoculation; chiefly, if not only, during the ulcerative stage—in the case of a sore; and the earlier the secretion, the more impregnated is it, probably, with the virus. In treatment, an ectrotic result is to be obtained, by timeous and decided use of an escharotic; which, converting all the poisoned textures into an instant slough, removes the disease—yet local and circumscribed; at the same time, probably, acting destructively, as a chemical, on the poison. Afterwards, management of the sore is simple; by medicated water-dressing.

If, however, the sore be not seen by the surgeon until it has attained an advanced stage, acutely inflamed, red, swollen, and very painful, perhaps with affection of lymphatics in the penis and groin, escharotics must be withheld. The inflammatory process is to be subdued by ordinary means; and, meanwhile, perhaps, something may be done towards decomposing and limiting the poison, by applying solutions of the chlorides.

When ectrotics fail, mercury is given—alteratively—in addition to the ordinary local treatment: in the third class of sore, and in obstinate samples of the second. During the local treatment of all cases in which ectrosis fails, it is well to stimulate the organs of excretion, by attending to the bowels, promoting the flow of urine by diluents and gentle diuretics, and determining to the skin. Antimony is most useful with this view; the object of such treatment being to favor elimination of the virus, by exaltation of ordinary means, in the hope that it may be excreted from the system as fast as it is conveyed thither by absorption from the primary affection, and that thus systemic zymosis may be prevented.

II. *Constitutional Syphilis* consists of secondary and tertiary symptoms. 1. Those which follow speedily after the primary affection, within a few weeks or months; usually during the second month; consisting chiefly of general cutaneous eruption, and affection of the throat; ushered in by febrile excitement, and, generally, by more or less change in the complexion, dryness of the hair, rheumatic pains in the ends of the long bones, and violent nervous headache, particularly in the forehead—aggravated at night, or rather by the recumbent posture.[1] 2. Those which occur more remotely, after six months or more have elapsed, and after the secondary train has already run its course; their most prominent and characteristic part being, affections of the skeleton, of glands, and of the superficial areolar tissue.

It is generally supposed that constitutional syphilis, having once occurred, is not so likely to return, or at least in a severe form, in the same patient, after venereal contact or inoculation. And some even imagine that the system once affected obtains complete immunity from return of the disease, as in the case of small-pox. On this latter supposition has been grounded an infamous proposal to inoculate as a preventive from syphilis;[2] a proposal only mentioned here for the purpose of characterizing it in words of disgust and indignation.

1. The *Secondary* eruptions—which are seldom itchy like those of nonspecific origin—are of different kinds. *Exanthematous;* roseola; following the simple sore, often at an early period. Not unfrequently it precedes the appearance of other forms of eruption; seeming to be the basis on which they subsequently form. *Papular;* lichen; the ordinary result of the first class of sore. *Pustular;* ecthyma; more frequently following the second class of sore than any other. *Tubercular;* prone to ulcerate untowardly; following the fourth class of sores. *Vesicular;* rare; large bullæ, surrounded by a copper-colored areola; becoming purulent, crusting, and tending to rupia prominens; sometimes following the second, but more frequently found after the fourth class of sore. *Scaly;* lepra or psoriasis; usually the result of the third class of sore; true syphilis. Sometimes condylomata form, contemporaneously with the eruption.

Such is the general arrangement; but, in practice, occasional confusion of the sequences need not excite surprise. Very frequently, the hair loosens, and comes away; threatening baldness. The throat is variously affected; by inflammatory process, aphthæ, or ulcer. Iritis not unfrequently occurs; and may follow any form of sore; it is more frequently found associated with the papular eruption, however, than with any other. Sometimes periostitis shows itself, on one or both shins.

A question here arises; are sores on the penis ever of a secondary character? No doubt they are. Eruptions degenerate into sores, very frequently, on the general surface; and there is no reason why the penis should be exempt from the general liability. Secondary sores there are known by their history; appearing at a long date after exposure to contagion. And they are also distinguished by absence of the ordinary characteristics of primary sores; usually superficial, inflamed, and of a peculiar hue; resembling aphthous ulceration of a mucous surface.

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[1] Ricord, Lancet, No. 1284, p. 384.

[2] Brit. and For. Rev., Jan. 1850, p. 261.

Secondary symptoms are shown, by experience, to be transmissible from father to child, from child to mother;[1] the blood being tainted with the virus, which has become multiplied by general zymosis; and the virus being communicated through the medium of tainted secretion. As yet, it is doubtful whether they are communicable by direct contact or inoculation.[2] It has still to be shown that the early, ichorous, non-purulent secretion of a secondary sore has not the power of propagating the disease.

In the papular form of eruption, and in many cases of the pustular, mercury is seldom necessary; in the tubercular, it is often hurtful. Antimony, sarsaparilla, guaiac, and the iodide of potassium, are powerful enough alteratives and eliminators; and, along with attention to the general health, suffice for cure. In the scaly form, however, mercury is always given; yet warily; never pushed to extreme ptyalism; and always ceased from, at least for a time, on amendment being begun. In the constitutional symptoms following on the sloughing sore, the phagedænic sore, or the sloughing phagedæna, mercury is studiously abstained from; experience having amply demonstrated its inefficiency as a means of cure, and the certainty with which it tends to ultimate aggravation.

It is never our object to repress the eruption in its first onset; on the contrary, its full appearance is solicited. Obstinate persistence, and repeated recurrence, however, we seek to overcome. And the object of our constitutional treatment is, simply to assist Nature in a full, early, and complete elimination of the poison; by acting on the skin, kidneys, bowels, and other organs of excretion.

The throat is steamed, fomented, touched with nitrate of silver, or blistered externally; according as it is the seat of active congestion, inflammation, ulcer, chronic inflammatory action, or passive congestion. Iritis has its own appropriate treatment, except when the sequel of the fourth class of primary disease; and then mercury is withheld, if possible—turpentine being substituted. Coming baldness is anticipated, by shaving the head; and it is well to keep it closely shaved for months, long after the other signs of constitutional disorder have wholly disappeared.

2. *Tertiary* symptoms seldom occur, except after the third and fourth classes of sores, and the worst examples of the second; unless when

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[1] The husband procreates an infected child, which may then propagate the secondary poison to the mother. Where there are no children, the mother does not suffer.—Ricord, Lancet. No. 1284, p. 384. A mother affected with secondary syphilis, after primary sores in herself, however, may be expected to communicate the disease to her offspring. A father affected after conception has taken place, does not taint the child then in utero.

[2] Some maintain that the husband has the power of communicating syphilis, in the secondary form, to the wife, directly through the semen; and that then the female may produce an infected fœtus. See Whitehead on Hereditary Transmission; and Brit. and For. M. C. Rev., April, 1852, p. 323.

mercury has been profusely and rashly administered. In any case, they are seldom urgent, when the result of venereal poison alone. It is only when this has been associated in the system with the mercurial poison, that severity is declared. In the milder cases, the bones and periosteum are affected by a chronic inflammatory process; those suffering most which are most exposed. In the more severe cases, suppuration takes place; sometimes superficial, between the bone and periosteum; sometimes in the interior of the bone; sometimes involving the whole girth of the bone; and resulting in ulceration, caries, or necrosis. Sometimes the skeleton is affected symmetrically; corresponding bones suffering at corresponding points; but it may happen that the whole of one side is free, while scarcely a bone of the opposite side of the skeleton is not more or less affected. The joints are liable to pains, stiffness, and chronic enlargement; similar to chronic rheumatic affections of these parts. The skin is subject to be attacked—more especially after the fourth class of sores—by tubercular formations, which assume the characters of rupia prominens, and degenerate into foul irritable sores; sometimes the initiative is by vesicular formation; sometimes the sore at once is formed by sloughing, followed by acute ulceration. The mucous membrane of the alimentary canal is liable to suffer at either extremity, but especially in the fauces—by congestion, and troublesome ulceration, usually of a chronic yet intractable kind; the anus may be the seat of aphthous ulceration, fissures, and condylomata. The tongue may become generally swollen; indurated at several points; at the edges and tip superficially ulcerated—the sores irritable and obstinate, sometimes spreading as if by chronic phagedæna; and the mucous surface of the cheeks, and gums, as well as beneath the tongue, may be similarly affected. Chronic enlargement of the lymphatic glands on the upper and back part of the neck is common. Deafness is no unfrequent occurrence; probably from congestion of the mucous lining of the ear. Iritis and bubo sometimes occur, in this class; the latter usually indolent; and the former tending less to severity than when a secondary symptom. The testicles not unfrequently undergo chronic and simple enlargement, with or without accumulation of serum in the tunica vaginalis.

Tertiary symptoms are not transmissible in any way.[1] Parents affected by them, however, impart scrofula to their children. Whatever their connection, mercury is generally superseded, in treatment, by the iodide of potassium; and this is assisted by attention to the general health—more especially as regards warm bathing, clothing, and regimen—and by other alteratives, if need be. In ostitic affections, obstinate, and attended with much nocturnal exacerbation, opiates are essential; and it may be that, ordinary means failing, we may be driven to small doses of corrosive sublimate. In obstinate affections of the skin and throat, too, the "liquor hydriodatis arsenici et hydrargyri" may be of service. And besides this constitutional management, the local affections of bones, joints, testicles, glands, are treated according to the general principles of surgery.

In tertiary symptoms following the fourth class of sores, the general rule still obtains as to the propriety of avoiding the use of mercury. There are cases, however, of occasional occurrence, which compel its exhibition. When the face or other part of the surface, is covered with ulcerating tubercles, when the tonsils are ever and anon the seat of bad ulceration, and when the tongue and cheeks are affected with a constant succession of painful ulcers, surrounded by induration, and extremely slow to heal; when such symptoms have resisted the ordinary non-mercurial treatment, and the patient is obviously declining in health—in such cases an alterative course of arsenic is sometimes of much service. But, if it fail, mercury is had recourse to; in combination with small doses of the iodide of potassium; and usually with the very best effect.

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[1] Whitehead and others are of a contrary opinion. See reference in footnote, p. 506.

Iodide of potassium is of great use in the treatment of all venereal affections; as an eliminator, probably, of the virus, as well as an alterative of the system. It is best given in the form of solution; beginning with a dose of two or three grains, given thrice daily; and gradually increasing it to half a drachm, or more, according as it is borne. It is not always necessary to induce the physiological effects. Some have a strong prejudice in favor of eight grains thrice daily, in camphor mixture; and adhere to that dose, throughout the period of exhibition; seldom finding any decided intolerance manifested by the system. Again, if a primary sore is slow to change, and to assume the healing process, this medicine is useful; provided there be no inflammatory excitement in either part or system—for that provision is always essential to its proper administration. In many of the secondary symptoms, it supersedes the use of mercury, in the chronic stage.[1] And, in tertiary symptoms of every kind and complication, it is pre-eminent and paramount. Sarsaparilla and guaiac, in the form of the compound decoction, are also not unimportant auxiliaries. Some affect to believe them quite inert; but we beg humbly to vouch for their possession of an important though minor virtue. In cases of intolerance of the iodide, by reason of idiosyncrasy, they often prove most valuable and efficient substitutes.

The Use of Mercury in Syphilis.

That mercury is specific—indispensable as well as infallible—for the venereal disease in all forms, is a maxim which, happily for mankind, is fast falling into desuetude. It is now abundantly established that many forms of the disease—nay the greater number of cases—are capable of cure without the use of this mineral; that, with simple means—that is, non-mercurial—the cure is shorter, the symptoms prove less grave, and immunity from future calamity—connected with the attack, its progress, or its mode of cure—is much more certain. In other words, the system is cleared quite effectually of the venereal poison; and it is saved from the pernicious effects of the mercurial poison—perhaps not the less formidable of the two. There are certain cases, however, in which it has been shown by experience, that a satisfactory issue cannot be obtained without recourse to mercury. And, in those cases, its judicious employment seldom leaves any deleterious impression on the system; there being then a decided tolerance of its administration (*Principles*, 4th Am. Ed. p. 148).

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[1] As a general rule, the place of mercury is as an opponent of secondary symptoms, that of the iodide to deal with the tertiary. And practical observation would seem to warrant another broad statement; namely, that obstinate secondary symptoms, for which mercury has been given, are always benefited by iodide of potassium; while obstinate secondary symptoms, for which no mercury has been given, usually require mercury.

Its *modus operandi* is involved in uncertainty. Many, especially of the old school, still believe that it has a specific and destructive influence on the venereal virus; that the two poisons meet in the circulation, and that a destructive influence is exercised there by the mercury or its antagonist. This may in part be true; but it seems reasonable to conclude that its beneficial operation mainly depends, like that of other constitutional remedies, on its alterative influence on the general system, and on its power of stimulating secretion and excretion, so favoring elimination of what is noxious. Long ago, it seemed the general belief that such elimination was mainly to be achieved through the action of the salivary glands; that the poison overcome in the blood, was to be excreted from it in the form of tainted saliva; and that the more speedily it was thrust out by the mouth, the more rapid and satisfactory would be the cure. Mercury, accordingly, was pushed invariably to profuse salivation; either in the belief that such was necessary for satisfactory elimination; or holding that copious ptyalism was the only sure sign of the mineral having been so thoroughly introduced into the system as to afford a good prospect of the poison's annihilation. In the beginning of the sixteenth, and end of the fifteenth centuries, when the venereal disease experienced such an aggravation as to alarm all Europe, the antidote was plied with a blind, empirical, and desperate profusion; and there is no doubt that, to this circumstance, rather than to any unusual virulence in the disease itself, its frightful ravages at that period are to be attributed. The primary symptoms were bad; but the secondary and tertiary symptoms were far worse; under the last the most frightful deformities and mutilations occurred—by affections of the bones of the face and cranium, and destruction of the soft parts of the nose, mouth, and throat—and death was no unfrequent termination of the hideous misery. Nowadays, we find no such severities, except when mercury has been heedlessly and unnecessarily given—perhaps in a strumous habit. And the undoubted rarity of mutilation, deformity, and death, by any part of the venereal disease in the present day, is reasonably to be attributed to a greater prudence in the treatment of the affection, more especially in the primary symptoms. Mercury is withheld in many cases, if not in most; when administered, it is given in moderation, and with a reluctant hand; alteratively, not cumulatively; frequently stopping short of ptyalism; never going beyond mere touching of the gums. Formerly, the ordeal of salivation was such as must have proved to many frames quite intolerable. Even Boërhaave, in the eighteenth century, laid down the following "axioms:" "If there is four pounds of saliva spat every twenty-four hours, it is sufficient!" "the salivation is to be continued until the symptoms of the disease vanish, which generally takes up six-and-thirty days!!" and "a small dose of mercury must be taken for six-and-thirty days more, to keep up a gentle salivation!!!" No wonder that patients died; and no wonder that some were found to prefer death to such a mode of cure![1] And yet, while in Europe suffering humanity was thus outraged by the profession, the natives in the West Indies, by the aid of guaiac alone, were showing an infinitely more favorable result. And among the former, too, there were not wanting some who became alive to the folly and danger of indiscriminate and extreme mercurialization; some driven to a better mode of reasoning and practice, by the stern rod of personal experience. Ulric de Hutten had himself been salivated eleven times, and thereafter became a zealous apostle of a treatment opposed to that of the majority of his fellow-practitioners.

But, while it is contended that mercury and the venereal disease are not inseparable—that a patient affected with the one is not inevitably to be affected by the other—it is yet to be admitted, gratefully, that this mineral is in not a few cases a most important remedial agent; used, however, much more sparingly than in former times; and, in consequence, not only more efficient as a means of cure, but also less likely to peril the future durability and soundness of the frame. By reference to statistics, it has been found that mercury, indiscriminately given in all cases, does not accelerate, but that on the contrary it retards, the ordinary healing of primary sores; that it does not prevent secondary symptoms, but that these coming after its exhibition are generally severe; and that the tertiary symptoms are both most frequent and most severe, when mercury has been profusely given in the previous stages. On the other hand, an indiscriminate withholding of mercury, in all cases, will present a much less favorable general result, than when mercury is judiciously exhibited in those examples of the disease in which it is found by experience to be not only useful, but in a great measure absolutely necessary to full and satisfactory elimination of the poison.

If ectrotic treatment of the primary sore have been successfully achieved, of course no mercury will ever be required; there is no poison in the system, with which it is required to contend. But, failing this, it is given—1. In the second class of primary sore, when it proves obstinate. 2. In the third class of primary sore, always. 3. In the papular and exanthematous secondary eruptions, only when they prove obstinate and recurrent. 4. In the pustular secondary eruption, if it prove obstinate; but not if it be consequent upon the fourth class of sore. 5. In the scaly secondary eruption, following the third class of sore, always. 6. In iritis, actively, unless when the affection results from the fourth class of sore. 7. In ostitic affections, of tertiary occurrence, when other means have failed to procure rest, alleviation of pain, and decadence of the constitutional irritation. 8. In tertiary affections of the skin and throat, of whatever origin, which have obstinately refused to yield otherwise. Experience also shows it to be essential to the removal of that secondary taint of system, whereby a parent conveys syphilitic suffering to the child.

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[1] Omnibus certe exulcerebantur fauces, lingua, et palatum; intumebant gingivae, dentes vacillabant, sputum per ora sine intermissione profluebat, unde et labia sic contacta ulcus trahebant, et intus buccæ vulnerabantur. Fœtabat omnis circa habitatio, atque adeo durum erat hoc curationis genus, ut perire morbo complures quam sic levari mallent.—ULRIC DE HUTTEN, 1519.

It is never given—1. In any case, during acute inflammation in the primary sore; otherwise, ulceration will certainly sustain aggravation; and sloughing, or phagedæna, may be induced. 2. Nor in any case, during persistence of febrile excitement in the system; otherwise, cure will be delayed, and the symptoms aggravated. 3. Nor in any form of disease connected with the fourth class of sores—excepting the rare cases of a tertiary character already specified—otherwise, such aggravation is to be dreaded as will either end fatally, or fix the deleterious poisons permanently in the frame. 4. It is well to avoid mercury, also, if possible, whenever the active presence of scrofula is plainly and prominently indicated.

The mode of exhibition varies according to circumstances: 1. It may be given in the form of calomel and opium; in the ordinary way. 2. Or blue pill may be given, in such doses as the cure demands; combined with opium or hyoscyamus, if pain or purging be occasioned; if mere griping occur, it may be enough to let each dose follow closely on a meal. 3. Either of these forms disagreeing, hydrargyrum cum cretâ will probably be found suitable; and this is the preferable form for children. 4. The corrosive sublimate, in very small doses, in pill or solution, is generally preferred in obstinate ostitic affections. And in such cases, also, it is sometimes of use to combine the mercurial with a tonic, or with small doses of the iodide of potassium. 5. In habits suspected of struma, the iodide of mercury is a suitable form; or a combination with iron may be given, in the "ferruginated" blue pill. 6. Inunction is useful, as an adjuvant to the internal exhibition, when speedy affection of the system is desirable; in iritis, for example, mercurial ointment is rubbed on the forehead and temple, while calomel and opium are given internally. It is also used alone, in cases which exhibit intolerance of the remedy given internally, in any form; then it is rubbed in, night and morning, in the axillæ, or on the inside of the thighs. 7. Fumigation, also, is sometimes employed; when other forms seem to disagree. The fumes are obtained from the red sulphuret, put on a heated iron; and they are applied to the system, by inhalation; to a part, by means of an oiled-silk tube or bag. Fumigation, however, is seldom used, except in cases of obstinate chronic affection of the throat, and tertiary enlargements of the testicle.

In the primary affections, amendment often shows itself before the mineral has given any other evidence of having affected the system. In secondary affections, the yielding is seldom so rapid; such continuance is usually necessary as touches the gums; and then the remedy is no longer pushed; but a minor dosing is maintained; the object being not to increase, but simply to maintain, the approach to ptyalism, until decadence begin to appear satisfactorily. Then the remedy is altogether withdrawn; although, it may be, that persistence or recurrence of the symptoms may afterwards require its resumption. In tertiary symptoms, also, it is generally necessary to attain to the evidence of systematic seizure; maintaining this, if need be, with the same niggard caution and economy.

Certain idiosyncrasies require consideration, in regard to the exhibition of this medicine. 1. Some patients are slow to show ptyalism, even under great and sustained doses. In them, it is not necessary to push the medicine until ptyalism is produced. 2. Others have their mouths touched—perhaps severely—with but a few grains. And, in their case, the dosing must be both minute and guarded. 3. Some suffer by pain and purging, in whatever form the mercury is given internally. In these, careful inunction is to be made trial of. 4. Some are actually poisoned by the mineral; the condition termed *Erethismus* being induced.[1] To such patients mercury can never be given, in any form; for the symptoms induced are such as imminently to endanger life. The patient is anxious, under an apprehension of great and impending evil; his muscular system is prostrate; he trembles, walks with difficulty and uncertainty, and his heart's action is weak and fluttering; breathing is difficult; an unpleasant sensation of weight or tightness is felt at the præcordia; both mind and body are incapacitated for all exertion; and, during some ordinary effort, he may expire by syncope. Such symptoms require instant discontinuance of the mercury, removal to a better and freer air, cautious use of stimuli, friction of the chest, generous diet, and avoidance of all exertion and excitement. 5. The system may not suffer, but the surface may; a very troublesome eruption occurring; vesicular, the *Eczema mercuriale*. This may be the result of either external or internal exhibition; when the former, it usually occurs in and around the part on which the ointment or plaster has been applied; when the latter, the first appearance is usually in the axillæ, or on the inside of the thighs, and thence the eruption may extend over the trunk. The vesicles soon break; and, instead of healing, are apt to degenerate into painful excoriations. Sometimes there is smart attendant constitutional disturbance. Treatment is by instant removal of the cause, and by exhibition of the soothing remedies which are suitable to such eruptions in general; the pain may be assuaged by opiate applications, the itching by an aqueous dilution of hydrocyanic acid. Liability to such an eruption does not forbid the use of mercury; but requires that it should be administered, when essential, in small doses, and with unusual caution. Its external use is certainly contra-indicated. 6. Some systems evince their tolerance of the remedy, by gradual loss of flesh, strength, and spirits—an asthenic state, partly anemic and partly hectic, becoming established. In such circumstances, mercury is to be discontinued; generous diet, with iron or other tonics, is given; and cure of the venereal affection must be sought by other than mercurial means.

Violent salivation may be caused by imprudent and excessive dosing, and by sudden exposure to cold during use of the medicine; or it may depend on an idiosyncrasy of system. The mercury must be discontinued; diet should be low; cool and pure air is to be breathed; and the mouth is rinsed, and the throat gargled, with weak brandy and water, or with solutions of the chlorides. If this prove insufficient, leeches may be applied over the angle of the jaw, followed by fomentation; so that a directly sedative effect on the salivary glands may be obtained. Chlorate of potass, given internally, has been found useful. After the febrile excitement has abated, diet is improved; and superficial ulcerations, in the mucous membrane of the mouth and throat, are touched occasionally with the nitrate of silver.

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[1] For Pearson's own description of Erethismus, see his work on Lues Venerea, 2d edit. p. 154.

Of the remote evil consequences of mercury on the system, much might be said. Of itself, sakelessly given, it may cause the most obstinate and serious affections of the skeleton. Associated untowardly with the venereal poison, its evil results show themselves as tertiary symptoms—even at a very remote period—and may be most formidable:—nodes, ulcer, caries, necrosis of bones; intractable ulcerations of throat, tongue, cheeks, and gums; exfoliation of the hard palate, and of the nasal bones; lupous ulceration of the nostrils, lip, or face; hideous deformity by loss of the nose and palate; caries of the skull, perhaps implicating the interior by perforation; ulcers and tubercular formations in the skin and areolar tissue; pain, misery, deformity, and death. Such calamities, happily, are now rare; but our museums can speak to their frequent occurrence in times not long bygone. The worst evils occur, when the mercurio-syphilitic cachexy is aggravated by association with the strumous. In treatment, we have not much in our power; and we may well plume ourselves more on prevention than on cure. The iodide of potassium and sarsaparilla are perhaps the only remedies which deserve a special mention, as antagonists of this depraved state of system; the rest is done by general treatment and hygiene.

Syphilis in the Child.

A father, laboring under secondary syphilis, may transmit the taint to his child. Or a mother, herself affected with secondary syphilis, may communicate the disease to the fœtus. Or a mother, laboring under genital sores, may give direct contagion to the child during parturition. Or the child may be infected, at a more remote period, by suckling a female possessed of secondary syphilis; the milk coming from tainted blood, and charged with the virus accordingly. Thus, in one or other, or in all of these ways, disease may be communicated at the earliest age. Sometimes the child is born laboring under the symptoms; more frequently, they show themselves after birth. The more prominent are—hoarseness of cry; a shrivelled, lean state of body; an anxious expression of face, often senile; chaps at the flexures of the limbs, and on the nates; a copper-colored eruption, sometimes studded with pustules, more frequently scaly; discharge from the nostrils; excoriation of the mouth and throat. When the mother is syphilitic at an early period of pregnancy, the child often does not arrive at maturity, but comes away dead and putrid, as an abortion; and this may happen repeatedly, until complete elimination of the poison from the parent's system has been obtained. For this purpose, a mercurial course is generally necessary—as can be readily understood, seeing that it is generally the true syphilis, or scaly eruption proceeding from the true chancre, which is communicated in this way. For a like reason, mercury is generally necessary in the child. It may be given indirectly through the nurse; or directly—as is to be preferred in most cases—by inunction, or by guarded doses of the hydrargyrum c. cretâ internally. Or mercurial ointment may be spread on flannel, and bound round the trunk, once a day, until the symptoms yield.

In nursing, precaution is necessary; as it is thought that a healthy nurse may have constitutional syphilis communicated in this way; the excoriated or ulcerated lips of the child producing a similar condition of the mammilla, and the ordinary class of secondary symptoms following. In such cases tubercles are apt to form about the anus and vulva of the nurse; and these may be the means of infecting her husband. It is possible, that in some cases the sores on the child's mouth may be primary, caused by lodgment of virus there during parturition—the unfortunate mother laboring under primary disease at the time.

Syphilis in the Female.

In the female, syphilis is peculiar only as regards the primary affections; and their peculiarity is chiefly as to their site; their general character, progress, and results, being very similar to the occurrences in the male. Females are more subject to condyloma; and if cleanliness be neglected, warts are very liable to form, sometimes attaining to large size, and involving the labia in hypertrophy. Sores are usually situated on the inner surface of the nymphæ, and in the orifice of the vagina; but they are also found in all parts of the vagina, on the os uteri, and sometimes in the urethral orifice; sometimes they affect the anus. Treatment is as in the male. Warty formations occasionally are of such size, as to require a regular dissection for removal of the hypertrophied mass.

Pseudo-syphilis.

Certain diseases not supposed to be of venereal origin, resemble some of the forms of constitutional syphilis more or less closely; the Radesyge in Norway; the Button-scurvy in Ireland; the Yaws in America; the Sibbens in Scotland—this, however, is lately supposed to be identical with the constitutional disorder consequent on condyloma. These affections belong to the province of the physician.

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CHAPTER XXXIV.

AFFECTIONS OF THE URETHRA.

Stricture.

CONTRACTION of the urethra may depend on one of three different causes. 1. There may be *Spasm* of the muscles connected with the membranous portion of the urethra, causing temporary diminution of calibre at that part, as well as resistance to instruments attempted to be introduced; and there is good reason to believe that a similar result is sometimes occasioned, in the anterior portion of the urethra, by spasmodic action of the muscular fibres which have lately been shown to form part of the normal structure of the urethra, and to extend throughout its whole length—continuous posteriorly with the muscular coat of the bladder.[1] These conditions are liable to be suddenly induced, by ordinary exciting causes; and they generally disappear readily—often rapidly—under ordinary treatment; hip-bath, fomentation, opiate enema or suppository, perhaps a sedative by the mouth, rest, quietude, and antiphlogistic regimen. 2. *The inflammatory process*, by its attendant swelling, may cause contraction. It may affect the lining membrane itself; either at one point, as in consequence of injury; or over a considerable space, as in severe gonorrhœa—one of the symptoms of which, as we have seen, is an obvious diminution of the stream of urine, dependent on the contracted state of the canal. Or the inflammatory process may be exterior to the urethra; in the substance of the prostate, in the areolar tissue of the perineum, or by the side of the rectum; and the bulging of the phlegmon, or abscess, may not only diminish the calibre of the urethra, at the affected part, but may even shut it up altogether, causing retention of urine. The treatment of such a case has already been considered; it is by antiphlogistics; withholding the catheter as long as possible, and using the bistoury for evacuation of matter at the earliest practicable period. 3. The canal may be narrowed by chronic structural change, occurring in the urethra itself; and this constitutes true *Stricture;* a condition which is ever liable to aggravation by the two preceding causes of contraction—spasm and the inflammatory process. And it is well to limit the use of terms thus: understanding "spasmodic stricture" and "inflamed stricture" to be aggravations of true organic stricture in one or other of these ways; understanding the terms "spasm of the urethra" and "urethritis," to include the condition of temporary narrowing of the canal by spasm and the inflammatory process; and understanding by "stricture," an organic change in the urethra, causing a narrowing of the canal, which may be altogether independent both of spasm and of existing inflammatory disease.

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[1] Hancock, Lancet, No. 1486, p. 187.

But stricture results from the inflammatory process, in and near the urethra; and this, as we have seen, may be excited in various ways. 1. It may follow the application of specific virus, as in gonorrhœa; and this is perhaps the most frequent cause of stricture. Clap is of common occurrence; the inflammatory process is often of long duration, as well as of such a kind as to favor plastic exudation; and treatment by injection is not unlikely to be so misconducted, as to cause maintenance or aggravation of such affection. 2. Stricture may follow a chronic inflammatory process, always of a minor grade—never reaching beyond active congestion—occasioned by constant excitement of the canal; as by excess in venereal indulgence, or by an acrid state of the urine. The latter is no uncommon cause; the urine may be simply acid, in excess; or it may hold more or less deposit; the bladder is emptied frequently: and, on each occasion, the urethra smarts under the passage of the urine. At length, a continued state of congestion is induced; and that brings not only discharge from the free surface of the mucous membrane, but also a certain amount of plastic exudation which remains. 3. External injury may be the exciting cause; lighting up an active inflammatory process in and around the injured part, and tending much to solid deposit—not always easily removed by absorption. Hence, blows and kicks on the perineum are found to produce the worst forms of the affection. A less amount of violence, often repeated, may induce gradual formation of stricture; as by contusion of the perineum on the saddle, in dragoons or others much employed on horseback. Also, there is good ground for fearing, that the disease not unfrequently originates in the unskilful and unnecessary use of bougies, lithontriptors, and other instruments. 4. Ulceration of the urethra cannot well heal, without causing more or less contraction of the canal; and this ulceration may be the product either of a common or of a specific inflammatory process. There is no more troublesome stricture than contraction of the orifice, in consequence of venereal ulceration there.

The proximate cause of stricture is plastic deposit, and consequent structural change, both in the substance of the lining membrane of the urethra, and also in the submucous areolar tissue; and it is important to remember, that it is in the latter situation chiefly that the deposit takes place. The ordinary sites of stricture are—at the orifice; at the neck of the glans, about an inch from the orifice; at the natural bend of the penis, from the suspensory ligament, between three and four inches from the orifice; and in front of the membranous portion of the urethra, between six and seven inches from the orifice.[1] The most frequent are the two last named. But it is seldom that a tight stricture is found at the posterior part of the urethra, without more or less contraction also at the ordinary sites in front; in other words, in cases of bad stricture, a plurality of contractions may generally be expected. When the affection results from external injury, the site obviously depends on the application of this.

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[1] The researches of Sir C. Bell, and others, have demonstrated that seldom, if ever, does contraction of the urethra occur posterior to the last-named site.

The extent and degree of contraction vary. Sometimes a shred of plastic deposit passes across the canal; and this rare form is termed the *bridle stricture.* Sometimes the stricture is tight, but very limited, seeming as if a thread had been tied tightly on the part. More frequently, the contraction is of greater extent; from a quarter of an inch to an inch; sometimes involving several inches of the canal. And the degree of contraction varies, according to the duration and treatment of the disease, from the slightest narrowing of the canal to its complete occlusion.

Behind the constricted point, dilatation takes place. Anteriorly to the actual stricture, there are collapse and contraction. The dilatation may be to such an extent as to hold more than one ounce of urine; and the mucous lining of the dilated part becomes prone to ulceration. Calculous matter may be retained there; and a stone may form, occupying the whole space. The mucous lining of the entire canal sympathizes more or less. From the strictured part, and also from the general surface of the membrane, an abnormal discharge proceeds; usually clear, sometimes puriform; and liable to be increased by casual excitement—this inducing aggravation of the congestion. Chronic prostatitis is apt to be induced; increasing the discharge. The lining membrane of the bladder becomes affected; the muscular coat too is changed, becoming hypertrophied; and, in consequence, both fasciculation and sacculation of the viscus may take place. The enlarged muscular fibres, arranged in fasciculi, act strongly on the urine; and the urine, not getting freely away through the strictured urethra; reacts on the mucous membrane, causing protrusion of this through the interspaces of the fasciculi. Cysts, thus formed, receive gradual additions to their parietes, and may attain to a large size—rivalling the bladder itself in magnitude. Chronic cystitis may follow. And morbid sympathy does not end with the bladder; the kidneys are in many cases involved; first in irritation, causing functional derangement only; afterwards in organic disease. The pelvis of the kidney, and the ureters, are often enormously dilated, their lining membrane furnishing much puriform discharge. The formation of stone, too, is favored, as was formerly remarked; derangement of the kidney's secretion leads to calculous deposit, and this is obstructed in its outward passage by the urethral change.

The symptoms of stricture are of gradual invasion, and may for some time escape the patient's notice. The urine is passed in an attenuated stream, sometimes twisted, sometimes scattered; the act is both frequent and tedious; and sometimes it is accompanied by pain and uneasiness in the bladder and penis, which abate on the bladder being emptied. After the patient supposes evacuation complete, a few drops —in some cases a considerable quantity—pass away involuntarily; coming from the dilatation behind the stricture. In consequence, the clothes are usually soiled and stained. The increased frequency of micturition is most observed at night. Discharge comes from the urethra, as already stated; and excess in diet or exercise may induce aggravation, resembling an attack of gonorrhœa, and very probably implicating the bladder. Pain is complained of in the loins and thighs, and in the perineum; often erection is painful. In tight strictures, the urine may pass only *guttatim;* and then, too, there may be no escape of semen in emission—this fluid passing backwards into the bladder, to be afterwards discharged in an altered state along with the urine. The testicles are liable to enlargement; and the rectum frequently sympathizes—becoming prolapsed, or inflamed, or fissured, or ulcerated, or affected with hemorrhoids; sometimes strictures of the urethra and of the bowel are found to coexist. The straining, in bad cases, is such as to empty the rectum as readily as the bladder; and in consequence the water-closet has to be used instead of the chamber-pot. Often hernia is induced. The prostate is liable to become not only excited but enlarged; and if this enlargement be chronic and simple, relief from the symptoms of stricture may be experienced; the prostatic tumor acting as a breakwater, in favor of the part originally affected. But if ulceration or abscess affect the gland, then aggravation must necessarily ensue. As the kidneys suffer, their secretion becomes more and more changed; and the acrid urine, passing frequently along the urethra, reacts unfavorably on the urethral disease. The complications of ague and gout are by no means unfrequent, in those advanced in years, and who have lived freely. Retention of urine is at any time liable to occur; the degree of constriction being suddenly increased by spasm, or by inflammation, or by both. From this cause, extravasation of urine may follow; urinous abscess, however, ending probably in the formation of fistula in perineo, is more common—generally producing mitigation of the symptoms, at least for a time, as will afterwards be explained. In severe and protracted cases, the general health suffers materially—independently of all accident; the flesh and strength fail, the digestive organs are impaired, the face is sallow, and the features wear an expression of anxiety almost pathognomonic of the disease. Constitutional irritation sets in; the symptoms denoting organic disease of the kidneys become more and more marked; purulent, mucous, ammoniacal urine passes often, in small quantities, and with much distress; febrile exacerbations recur with greater force and frequency; emaciation advances; the appetite and digestion fail more and more completely; at length coma may supervene, and the patient perishes.

Treatment is conducted on simple principles; but a satisfactory cure is often of very difficult attainment. Our object plainly is, to get rid of the redundant deposit which causes the contraction; and this may be effected in one of two ways: 1. By simply procuring absorption, under the stimulus of pressure; 2. By so managing the application of pressure, as to establish a temporary and active congestion in the part, which, on its resolution, may induce rapid diminution of the deposit—somewhat in the same way as the injection of a hydrocele removes a redundancy of serum. Advance of the inflammatory process, however, to a high grade is obviously to be avoided; true inflammation will cause further deposit around; and ulceration—at the time perhaps widening the canal—is likely ultimately to lead to renewed and probably aggravated contraction, by puckering of the cicatrix. Besides, ulceration, to prove effectual on the submucous deposit—the true cause of the stricture—must first penetrate and destroy the mucous membrane; an event never desirable; 3. In bad cases, the knife may be necessary to free the contracted part;

not, however, as a sole means of cure; but to assist the bougie in afterwards establishing the normal condition of the part.

To obtain the curative result, in ordinary cases, cautious management of the metallic bougie is now universally acknowledged to be the most suitable means. But, in the first instance, exploration is necessary; to ascertain whether a stricture exists or not, as also its nature and extent. A metallic instrument may be used for this purpose; but one of wax is sometimes preferred, as less formidable to the patient, and capable of conveying very explicit information as to the state of the urethra. A large one is not suitable obviously; neither is one of small size—for it is liable to catch a lacuna, and so to indicate stricture when there is none; or, passing through a stricture of no great tightness, it may lead to the belief that the canal is clear, while contraction really does exist. One of a medium size is selected; and, having been warmed gently, and made pliable, by the hand, is introduced cautiously. If obstructed, it is gently withdrawn a little, and then pushed on again; a fold of the urethra may have been in the way. If, however, still opposed, the existence of stricture may be fairly presumed; and its site is noted, by observing the extent to which the instrument has passed. To elicit further information, the bougie is pushed steadily onwards, so as to fix its point in the stricture; and, on withdrawing it, a tolerably accurate idea may sometimes be obtained of the extent and character of the contraction, by observing the marking of the instrument's point. The wax bougie is then laid aside; its office is exploration;[1] and now, for the cure, one of metal is taken up, of such a size as is likely to pass without much difficulty. The most convenient kind of bougie is that manufactured of Berlin silver; hollow and consequently light, yet firm enough; and always possessing a smooth surface. The curve should be gradual and slight—a segment of a large circle; and the set of instruments are arranged in a gradually ascending scale, from the smallest wire-like form, to what is likely to fill the average canal in its normal state. The selected instrument, oiled, or smeared with cold cream—sad mischief has happened from croton oil having been mistaken for the bland fluid —is passed down to the seat of stricture, and steadily pressed onward, with intent to pass through it. Having succeeded in this, the instrument is permitted to remain, from a minute to half an hour, or more, according as the patient's feelings may indicate. If sickness occur; or if much pain be felt, and on the increase; or if the patient express a decided wish for removal of the instrument, stating his belief that it is "hurting" him—it should be withdrawn; remembering that our object is, to excite not inflammation, but absorption only. Rest and temperance are essential, for that day. On the second or third day, we expect the uneasiness occasioned by the former introduction to have passed away; and the operation is repeated; introducing the same instrument as before, then immediately withdrawing it, and substituting a size larger. And this is repeated at longer or shorter intervals, until the full size is passed readily. This last is repeatedly introduced at the ordinary intervals, until all obstruction has fairly disappeared; and then the stricture may be regarded as cured—though not finally disposed of. A tendency to recontraction remains. And, to obviate this, an occasional bougie is required—sometimes termed the *protesting* bougie—at a gradually increasing interval; the first introduction taking place at the end of a fortnight, then after a month, then after two months, and so on; until, after introduction at an interval of six months, all is found normal. Thus only can immunity from relapse be secured.

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[1] Many surgeons never use the wax bougie, even for exploration. No doubt, the metallic instrument is quite capable of fulfilling all ordinary indications in this way. But if a wax instrument is to be used at all, this seems its proper place.

Such is the ordinary course of events, in a plain and simple case; but many circumstances require attention besides. And, in the first place, in commencing the treatment of stricture, it is essential to have regard to the general health, and especially to the state of the urine. If an acrid fluid be frequently passing over the canal, little or no progress can possibly be made; the disease need not be expected to give way, while a cause of maintenance, if not of origin, is in constant operation. It is also very important that regimen should be strictly regulated; and that walking exercise should be indulged in as little as possible. Horseback exercise must be absolutely prohibited.

The instrument is held lightly in the hand, and is never pressed onwards with much force. Force of propulsion, and tightness of grasp, may tear the urethra, pushing the unentered stricture before the instrument's point—if this be kept straight; or, if any divergence be made from the true direction of the canal, the parietes are perforated, and a false passage is established. Lightness of grasp, and gentleness of propulsion, permit the instrument to be restrained by the walls of the urethra; and all such hazards are avoided. The point is pressed steadily on the stricture for a short time; and then, withdrawing the hand, we observe whether the instrument resiles, or remains fixed in its place; if the former event occur, it is a sign that no penetration of the stricture has taken place; the latter is a token of the instrument's point being lodged in the contracted part. And according to the evidence thus afforded, either a smaller instrument is selected, or the onward pressure is steadily maintained. In the latter case, our chief care is to avoid the use of force, and to exert the steadily maintained pressure not on the sides of the canal, but on the obstruction in its direct course; and, to assist in this, when the stricture is behind the scrotum, the forefinger in the rectum is often of use.

An obstacle may be felt at the bougie's point, near the neck of the bladder; and yet it may not depend on stricture. The canal may be of its normal calibre throughout; but made tortuous, by unequal enlargement of the lobes of the prostate. In such a case, a flexible instrument is more likely to pass than one of metal; the passage is to be traversed, not forced—"arte, non vi"—and much assistance is derived from the finger in ano. Another obstacle, not connected with stricture, may be occasioned by osseous deposit on the rami of the ossa pubis, or upon their symphysis; the result of injury, or of idiopathic ostitis. It is of rare occurrence. A cautious turning of the instrument's point to a side will probably elude such obstruction.

A stricture, at first wholly resistful of the instrument's point, may in a short time yield to it. Instead of attempting at once to penetrate, therefore, steady pressure is kept up; and, after a few minutes we may expect such an amount of relaxation to take place as may admit either of the instrument passing completely, or of its becoming lodged in the strictured part.

It is not essential to the cure, that penetration should be complete at first; and this undoubted fact has an obvious and important bearing on practice. Having found a tight and unyielding stricture, which will not, without force, permit penetration, even by a very small instrument; and if there be no threatening of retention of urine, or other urgency:—we lay aside small bougies, and the determination to penetrate, and, selecting an instrument of medium size, pass it down to the stricture, and retain it there—on the stricture, rather than in it—as long as the patient's feelings will allow. This is repeated at the usual intervals. And, after several such introductions, relaxation will be found gradually advancing, so as to admit first of partial lodgment, and afterwards of complete penetration. No time is lost; and no risk is incurred. The principle of cure is obviously the same as that of the ordinary use of the instrument.[1]

Should, at any time, over-excitement—as evidenced by tendency to bleeding, pain, spasm, and discharge—occur in the part, from over-use of the bougie, exposure to wet, fatigue, intemperance—all instrumentation must be desisted from, for a time; until, by rest, and antiphlogistic regimen, a quiet and tractable condition of the canal has been restored.

In receiving the bougie, the patient may be either erect or recumbent. If it be his first experience of such an operation, the latter posture is preferred; lest faintness occur, as is apt to be the case. After one or more repetitions, such tendency ceases; and then the erect posture is more convenient for both parties. The surgeon, seated in front, passes the instrument with its convexity directed towards the abdomen, down to the suspensory ligament; and then gently depressing the handle, while the instrument is slowly turned half round, this natural obstruction is overpassed. To avoid injury to the canal here, it is well to move the point mainly on the upper surface of the urethra. If an opposite course be followed, a fold of the membrane is almost certain to be caught; then rash pressure cannot fail to cause abnormal penetration—and a *False Passage* is begun.

The evidences of a false passage being formed are:—the consciousness of having used an unusual and unwarrantable degree of force; an uncertainty as to the point having been in the true direction; a want of the ordinary sensation of being grasped, as the pressure is continued; a sensation of something having suddenly yielded; when pressure is then continued, a feeling of roughness and rubbing on the instrument's point—and the bougie is then apt to advance, not smoothly, but per saltum; a complaint from the patient of unusual pain—perhaps with a start, and then faintness ensuing; blood welling out, in greater or less quantity, by the side of the instrument. Very frequently, the patient decidedly corroborates our own apprehensions, by declaring his conviction that the normal canal has been departed from.

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[1] To this mode of procedure the term "tunnelling" has sometimes been applied; portion after portion of the stricture being excavated, as it were, until clear "driftway" has been established. I can vouch for its safety and efficiency.

Such things ought not to be; the risk is great. And they need not be; for, by avoidance of force, and by the exercise of ordinary caution and skill, all such accidents are rendered more than unlikely. The only circumstances in which force is at all excusable, are those of urgent retention. Then the bladder must be relieved, as we have seen. But, of all the methods of affording relief, forcing the stricture is probably the worst. If there be time and indication, leeches, fomentation, hot-bath, sedatives, and antispasmodics are tried; and, failing these, the obstruction is overcome by incision.

The risks of false passage are:—1. Escape of urine, and consequent sloughing or abscess, according to the extent and manner of the infiltration. If the false passage be incomplete, opening into the urethra only on the distal side, urine does not enter so readily as when the perforation is complete—having both a distal and a proximal opening. The incomplete form, consequently, is more likely to cause urinous abscess; the complete, urinary infiltration. 2. Hemorrhage may be considerable. 3. Inflammation may seriously affect the part, causing softening and ulceration; and healing cannot take place, without contraction—worse probably, than the original stricture. And, besides, during the persistence of inflammation, constitutional disturbance is likely to be severe, bearing hard on a system already enfeebled. 4. Or, in the especially feeble, a formidable amount of constitutional irritation may occur, irrespective of local inflammation.

A false passage having been formed, it is with difficulty avoided in subsequent introductions of the instrument. For some days, nothing should be passed along the canal; an opportunity being thus afforded for closure of the track; or, at least, for such diminution of it as may render entanglement of the instrument less likely. And when this is again used, it must be with a very lively caution; the hand being alert, as it were, to notice the first and slightest deviation from the normal path.

In some patients, there is an especial irritability, which tends to balk the bougie; perineal spasm supervening on the introduction being attempted, and receiving obstructive aid, probably from a turgescent state of the lining membrane. Such a difficulty may be partially or altogether avoided, by the exhibition of a moderate opiate, by the rectum or mouth, about half an hour before the attempt at introduction—or by the employment of anæsthesia. Other patients are liable to suffer from aguish attacks, after use of the bougie. Such are generally elderly persons, who have lived freely and been abroad. They benefit greatly by the use of quinine.

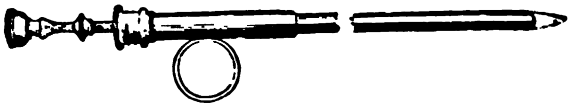
Hitherto, we have been speaking only of the ordinary cases which require the ordinary application of instruments, in expectation of the ordinary result—disappearance of the redundant deposit, by absorption; this absorption being excited, simply and directly, by pressure. We now come to another class of cases, requiring another effect of the instrument—the second which we formerly noticed; excitement of an active congestion, whose resolution may carry with it removal of not only its own effusion and exudation, but also of the deposit of former times. These are tight and unyielding strictures, of considerable extent and long duration. A very small instrument may be insinuated into or through them; but no progress is made; on each introduction, there is the same difficulty to be overcome. In such cases, the treatment requires a modification; a higher result is to be obtained from the instrument's use. A firm silver catheter is carefully passed through the stricture; and is retained by tapes, which are appended to the rings of the instrument, and secured, like the lithotomy tube, to a bandage round the waist. The orifice of the instrument is shut by a plug of wood or cork, which is to be removed, from time to time, for evacuation of the urine. At first the catheter is felt tightly fixed; and, after some time, the embrace is found to become more and more close, in consequence of the crescent inflammatory process, and its attendant swelling. The foreign body's presence is resented, in the usual way; and an effort is made for its extrusion. The temporary lodgment of a smooth metallic substance in an open mucous canal, however, does not inevitably cause true inflammation; and, accordingly, the process is generally found to fall short of this, and to follow the ordinary course of acute congestion—resolving itself by copious discharge. This occurring, relaxation and widening of the canal take place; absorption and exhalation on the free surface, both busily conducing to this desired result; and then the instrument—before, fixed and firm, as in a vice—will be found loose and movable. It is now withdrawn; and a bougie, of comparatively large dimensions, may be passed in its stead. This is permitted but a brief stay; and then the ordinary instrumentation is proceeded with, as in other cases.

This method of treatment, it is obvious, requires great care; there being always a risk of inflammation locally, as well as of untoward constitutional disturbance. And the case must be watched accordingly. There is always considerable uneasiness in the part, during the instrument's stay; and some excitement of the system may seldom be avoided. It is only when either proceeds to excess, that the instrument has to be prematurely withdrawn. In some patients, it may be safely retained for twenty, thirty, or forty hours; in others, that time must be greatly abridged. Opiates are of service, in allaying the pain and irritation. And if by their use, all untoward symptoms are averted, we need not regulate the catheter's stay by any fixed limit of hours; but may regard its thorough loosening as the first sign of the propriety of its removal. It is seldom, however, that a retention of more than twenty-four hours is required. And, in that short space of time, if the case proceed favorably, we may expect threefold more progress than under the ordinary system of management. This method, however, though rapid, is doubtless attended with some risk, which the other method wants; and therefore is wisely held applicable only to the severer forms of stricture, on which ordinary means may have produced, or are likely to produce, but little effect.

But there are worse strictures still, to which even this treatment is unsuitable—because of their extreme tightness, and unyielding nature. An instrument cannot be made to penetrate; and it is difficult permanently to retain one but partially introduced. In these cases, we must be content with the treatment already noticed, of passing down a bougie, of medium size, at the ordinary intervals, and retaining it in contact with the stricture for some time; expecting that, in this way, the desired diminution of deposit by absorption may advance. But, if excitement occur, the case becomes urgent by retention of urine; and then we are forced to relieve the bladder. The stricture must be got through. A firm instrument, of suitable size, is patiently and gently used—remembering that by the inflammatory process the parts have had their lacerability much increased. With the aid of sedatives and antispasmodics, we may succeed. But, if baffled in this legitimate use of the instrument, we are not warranted in having recourse to force. It is better to cut than to bruise and tear; it is better to make a clean wound through which urine may discharge itself innocuously, than to leave a bruised and torn sinus in which infiltration can hardly fail to occur, with all its lamentable results. The patient, under chloroform, is put into the position suitable for Lithotomy; and an incision is made in the central raphé, as formerly described. The bladder having been relieved, and the stricture cut through, a catheter of medium size is passed from the orifice of the urethra to beyond the seat of stricture, and is retained as long as the feelings of the patient will permit. Then it is removed; but on excitement having passed off, it is re-introduced; and thus we endeavor to retain the canal of considerable width, while the external wound slowly closes. On cicatrization being nearly completed, the size of the catheter or bougie is gradually increased; and instrumentation is continued, in the ordinary way, until full dilatation shall have been completed. This is the treatment of extreme cases—complicated with the crisis of retention. To such only is it applicable. And of the skilful surgeon it is comparatively seldom required.

Incision has been practised from within the canal, by the employment of lancetted catheters. But these are dangerous weapons, very obviously, in the hands of the inexperienced; and the most skilful must have difficulty in using them with safety, in the case of stricture posterior to the scrotum. There can be no certainty of the incision being made in the true direction; the walls of the canal may be injured; and then infiltration of urine can hardly fail to ensue. For very tight and unyielding contractions anterior to the suspensory ligament, however, the method is not unsuitable. The straight instrument of Mr. Stafford

Fig. 258.

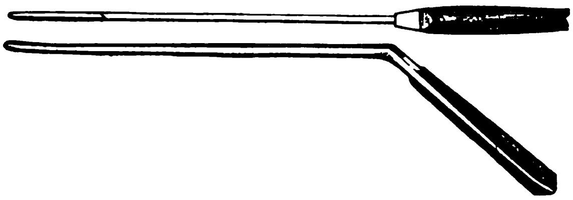


[Mr. Stafford's straight Lancet-Catheter: the lancet-point marked by the dotted lines. (From Fergusson.)]

can be passed down, and held directly on the diseased part; and the operator can make sure of pushing onwards the cutting stilet in the right direction. After this, a common bougie may find itself but little opposed, and may pass readily on to the bladder. But even then there is always some risk of accident by escape of urine into the cut parts. And, accordingly, we would limit the use of the straight and short cutting catheter, to those cases of anterior stricture which resist the ordinary means; and would dissuade from the use of the long and curved cutting catheter, under any circumstances whatever. It is but seldom that even the former will be required.

Orificial stricture—tight, callous, unyielding, sometimes admitting the most delicate probe with difficulty—is usually the result of cicatrization; and the sore has probably been of venereal origin. By probes, or short bougies, occasionally introduced, a cure by dilatation may sometimes be procured in the ordinary way. But, very frequently, it is found necessary to expedite the process by incision. A narrow probe-pointed bistoury is introduced; and, by its edge, the contracted part is notched all round. [Mr. Fergusson recommends, for this purpose, and especially for incising strictures beyond the reach of an ordinary bistoury, the instruments here represented. They consist of a long straight director or grooved staff, and a narrow short blade, with a spade point, at the end of a stalk sufficiently slender to be passed along the groove. The knife is long enough to be pushed beyond the extremity of the groove, if this be thought desirable or safe, and the operator be qualified by anatomical experience thus to use it.] A bougie is passed immediately afterwards, of such a size as will penetrate without force. And repetition is made daily in an ascending scale; a less interval than usual sufficing here, in consequence of there being less irritability than in the deeper-seated portions of the canal. Sometimes, it may be found necessary to lay the contracted part entirely open by incision, introducing the bougie afterwards through the wound; and seeking for a cure of the stricture, at the cost of establishing the imperfect state of the urethra, similar to the congenital malformation termed Hypospadias.

Fig. 259.

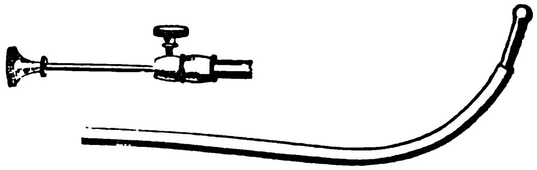


[Mr. Fergusson's Instrument for incising Stricture of the Urethra. (From Fergusson.)]

It is easy to understand how spontaneous alleviation of stricture may occur; either by absorption, or by ulceration. But it is probable that such an occurrence is actually very rare; and, certainly, it is not to be trusted to in practice. Relief by the latter mode, indeed, is scarcely desirable; inasmuch as the cicatrix of the ulcer is likely to reproduce contraction, perhaps in an aggravated form.

For a like reason, the caustic bougie has fallen into comparative desuetude. To prove successful as an escharotic, in clearing away obstruction, the mucous membrane must first be sacrificed; and though, for a time, ample space may be thus obtained, yet in the end recontraction is obviously inevitable; partly by reason of the plastic deposit which surrounds ulceration, and partly by reason of the contraction which invariably attends on cicatrization of a sore—unless, indeed, reproduction of the urethra's wall, by new tissue, be considered possible, during the cure. The best use of the "caustic bougie" is, not as an escharotic, but as a corrector of irritability. If a peculiarly irritable stricture resist the ordinary means, already alluded to, decided benefit may be obtained by the application of nitrate of silver to the contracted part and its vicinity. This may be accomplished, either by the porte-caustique, recommended by M. Lallemand; or by means of the old-fashioned instrument —a wax bougie, in whose hollowed point a portion of the nitrate is imbedded. For a stricture at all penetrable, the former is the preferable instrument; but a tight contraction can be directly reached, only by the latter mode of conveyance. [For a safer instrument, see p. 549, Fig. 275.]

Fig. 260.



[Lallemand's Urethra Porte-caustique. The caustic is contained in the cup, which is shown projecting from the end of the instrument; it is attached to the stylet represented at the other end. (From Fergusson.)]

Instead of nitrate of silver, caustic potass is used by some; not as an escharotic, but as an "alterative."[1] A small portion—from a grain to the eighth of a grain—having been inserted in a hole made in the point of a soft bougie, is passed rapidly down to the stricture, and held there for one, two, or three minutes; and repetition is made in four or five days, after irritation has passed away.

It is probable that what are termed "elastic" strictures—strictures which dilate under the ordinary treatment, but speedily relapse, and become tight as before—often depend on an unusual irritability of the canal; and that they will be more appropriately treated by the occasional application of nitrate of silver—in conjunction with the ordinary use of the bougie, and suitable general treatment—than by the employment of cutting instruments.

Lately, under the auspices of Mr. Syme,[2] external incision has been freely applied to strictures of the urethra; first passing a small grooved staff through the stricture, and then cutting into the groove at the contracted part, by perineal wound. To avoid hemorrhage, the incision is placed carefully in the central raphé; and on withdrawing the staff a catheter is introduced and retained as after the old operation. Until this is done, it is well to have the patient deep in anæsthesia, with a view to avoid urinary infiltration by voluntary action of the bladder. By subsequent use of the bougie, in the ordinary way, permanent as well as rapid dilatation of the canal may in many cases be obtained.[1]

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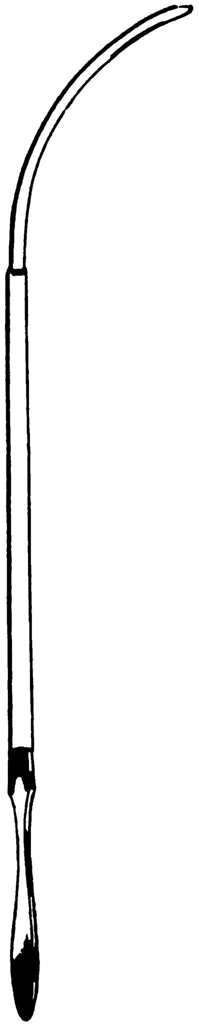
[1] Wade on Stricture, Lond. 1849.

[2] Syme on Treatment of Stricture by Perineal Incision, Edin. 1849.

The advantages of this procedure are, accuracy of division, and rapid approach to cure. The disadvantages are, the ordinary risks of such operative procedure, and the uncertainty of being able in all cases to insinuate (not force) a small instrument through the contracted part, Some few strictures, we believe, are really "impenetrable;" and are consequently to be treated ordinarily by the "tunnelling method"—in the crisis of retention by perineal incision according to the old way. The great majority of "penetrable" strictures, on the other hand, are capable of safe and satisfactory cure, without the use of cutting instruments. But to some few of those which refuse to yield to ordinary treatment, and in whom great irritability of system prevails, this mode of operation seems very suitable—an operation whose proper character will probably be fixed hereafter, as neither so safe nor so generally applicable as its promoter at first imagined, nor yet so dangerous or disappointing as some of its opponents have declared.[2]

Another mode of treating obstinate stricture—recently devised—is by tubular dilatation; introducing a small bougie or director through the stricture, and on that passing down tubes of increasing size; the object of the apparatus being to secure accurate introduction and rapid dilatation.[3] Time is yet wanting to warrant a decided opinion of the merits of this proposal; but facts, as far as they go, speak in its favor, as being both suitable and safe.

Fig. 261.



[Grooved staff of Mr. Syme—Half the actual size. (From Gross.)]

Urinous Abscess.

This consists in the condition of abscess, complicated with a communication with the bladder or urethra, and consequently having a greater or less admixture of urine in its contents. The formation may occur in one of two ways: from without or from within. 1. An abscess may form exteriorly to the urinary passages—excited by injury or by the irritation of stricture or stone; and, in its progress by enlargement, it may open into the urethra, or bladder—according to its site. Then, through the ulcerated aperture, urine enters. Its stimulus, within the purulent cyst, necessarily kindles a fresh amount of inflammation. If this advance rapidly to ulceration of the tissues composing the limits of the original abscess, urinous infiltration takes place, with sloughing of the affected parts. But if the pyogenic membrane remain entire—perhaps strengthened by a renewed and plastic exudation—then the escaped urine remains limited within the suppurated space, and the state of urinous abscess is established. The collection may assume quite a chronic character; but, in general, it extends more rapidly than an ordinary acute abscess, hastening to the surface, and discharging thin, dark-colored, and fetid contents.

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[1] It is a great mistake to suppose that the performance of this operation altogether supersedes the use of the bougie. To act on this supposition were to court return of the contraction in almost every instance.

[2] Lancet, March 22, 1851.

[3] Wakley, Lancet, No. 1438, March, 1851; and *Ibid.* No. 1484, p. 144

2. Or, as more frequently happens, the affection originates in ulceration of the lining membrane of the urethra or bladder. Acute ulceration, and also direct laceration, of the mucous membrane is liable to occur, as we have seen in the case of retention of urine; then rapid escape of that fluid takes place, under powerful action of the hypertrophied muscle of the bladder; and the most formidable extravasation results. But, unconnected with any such crisis, a more gradual giving way may take place; the urine, escaping first in a few drops, may excite an inflammatory process of a sthenic type; the abscess formed has all the ordinary characters—the important limiting barrier of plastic exudation not accepted; and, as it enlarges, these are not destroyed. Before the actual ulceration, too, it is probable that an inflammatory process has been slowly advancing in the tissue exterior; which has thus become in some measure consolidated, before any urine has had an opportunity of entrance.

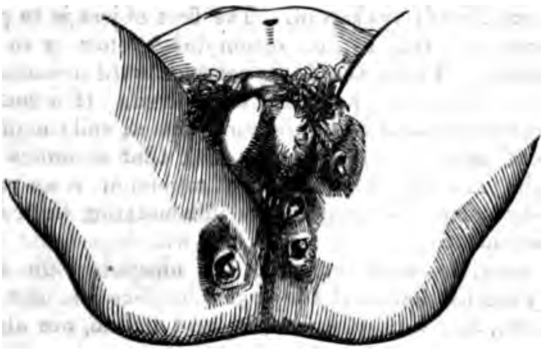
Or, as has already been stated, the commencement may not be by ulceration, but by wound or tear—inflicted by an unskilful use of catheters, bougies, or other instruments.

But the term "Urinous, or Urinary Abscess," is generally understood to refer to the urethra. Its origin is commonly from within; and the usual exciting cause is stricture. The urethral ulceration may be either immediately behind the stricture, or at some distance posteriorly. The ordinary site is in the perineum. There a hard swelling is discovered, on pressure; the ordinary symptoms of stricture undergo aggravation; shivering and febrile disturbance occur; and, perhaps, by the pressure of the abscess, retention of urine may be occasioned. Treatment consists in making a free external incision, for the evacuation of matter and urine; afterwards removing the cause, the stricture, in the ordinary way.

Urinary Fistula.

This may follow wound in the perineum, implicating the urethra. More frequently, it is the result of urinous abscess. The collection has opened spontaneously in the perineum, temporarily relieving the symptoms, both of abscess, and of stricture; but, by persistence of the latter, closure and cicatrization of the abscess are prevented; the irritation of the stricture maintains a morbid degree of excitement, and the obstruction which it occasions forces the urine into the abnormal channel. The abscess consequently does not close; but partially contracting, degenerates into the condition of fistula. There may be but one fistula, or several; in the perineum, or traversing the scrotum, or anterior to the scrotum, or on the nates. Sometimes abscess burrows beneath the fascia of the penis, and opens near the glans; sometimes the opening is on the dorsum of the penis. Also, one abscess, having more than one external outlet, may lead to the establishment of more than one fistula; or, each fistula may be connected with a separate abscess. The discharge is thin and gleety; often copious. Sometimes a constant dribbling of urine exists; in other cases, urine escapes only during an expulsive effort. The surrounding parts are tender and excoriated; the patient is in a constant state of discomfort; and very frequently his general health suffers seriously.

Fig. 262.



Example of Fistula in perineo.

Treatment is simple; directed to the stricture, not to the fistula—at least in the first instance. The stricture having been thoroughly dilated, the urine comes again by the normal channel; the fistula contracts and dries; and, in many cases, it wholly closes, without any direct treatment having been received. Should contraction prove tedious and incomplete, the hot wire may be used; applied not to the mere orifice, but deep in the track—lest premature closure of the external part might take place; not repeated frequently, but at long intervals—it being our object to obtain the benefit of the healing process which follows remotely on the burn, not the destructive and inflammatory effects which are its primary result. If sinuses communicate with fistulæ, it will probably be necessary to lay them open with the bistoury. In cases long neglected, in which the whole urine has for years been passing by the perineum, the urethra anterior to the opening contracts greatly, and may be almost completely obliterated. Dilatation is then effected with great difficulty; and recourse to the method by incision will probably be expedient.

Sometimes the abscess opens, not in the perineum, but into the rectum; and fistula forms in the bowel. Urine passes per anum, and air, or even fæces, may escape by the urethra. The treatment is the same as for the more common varieties; the speculum ani being used to protect the bowel, when it is necessary to employ the cautery.

Laceration of the Urethra.

This has been already spoken of. The first object is to prevent infiltration of urine; and that can be accomplished only by early introduction of the catheter, which should be retained until a sufficient time for consolidation of the injured parts has transpired. If a catheter cannot be passed, incision must be had recourse to, as already explained. But extravasation of urine is not the only risk that demands our regard. That over, the risk by inflammatory accession remains; a minor amount is likely to cause stricture; true inflammation will cause abscess; and this, communicating with the urethra, will degenerate into perineal fistula. Leeching, fomentation, rest, and antiphlogistic regimen, are therefore very essential after the injury. Neglect a severe kick or blow of the perineum, and stricture, abscess, and fistula, are almost sure to follow.

Everard Home, Practical Observations on the Treatment of Strictures in the Urethra, &c. Lond. 1805. Arnott, Treatise on Strictures of the Urethra, &c., Lond. 1819. Charles Bell, Treatise on Diseases of the Urethra, &c., by Shaw, Lond. 1822. Ducamp, Traité des Retentions d'Urine Causées par le Retrecissement de l'Uretre, &c., Paris, 1822. Lisfranc, des Retrecissements de l'Uretre, Paris, 1824. Macilwain on Stricture of the Urethra, Lond. 1830. Amussat, Leçons sur les Retentions d'Urine Causées par le Retrecissement du Canal de l'Uretre, &c., Paris, 1832. Stafford on Strictures of the Urethra, Lond. 1836. Brodie, Lectures on Diseases of the Urinary Organs, Lond. 1842. Wade on Stricture of the Urethra, &c., Lond. 1849. Syme on Treatment of Stricture by Perineal Incision, Edin. 1849 and 1855. Lizars on Stricture of the Urethra, &c., Edin. 1851. Wakley, Lancet, 1851. Thompson on Stricture of the Urethra, Lond. 1854. [Gross, on the Urinary Organs, already cited.]

CHAPTER XXXV.

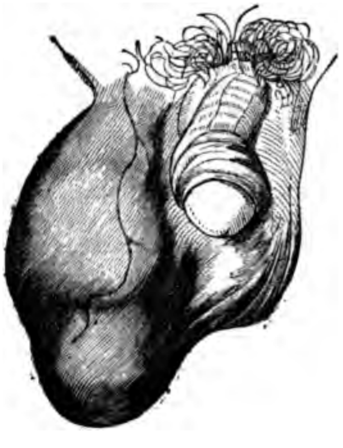
AFFECTIONS OF THE TESTICLE.

Orchitis.

THE inflammatory process affecting the testicle may be acute or chronic; original, as following external injury; or secondary, the consequence or attendant of gonorrhœa. Sometimes it is an accompaniment of Mumps—inflammatory enlargement of the glands in the upper part of the neck; not improbably depending then on metastasis.

Secondary gonorrhœal orchitis is usually acute, and is the most frequent form of the affection. It is also known as *Hernia humoralis.* There being an increased susceptibility in all the genital system, during the existence of gonorrhœa, orchitis may be lighted up at any time, by the application of a slight exciting cause; a squeeze, excess in walking or diet, exposure to cold and wet, or premature use of strong injection. But, without any apparent exciting cause, the attack is liable to occur; and then seldom until some time has elapsed—usually in the third week of the gonorrhœa. It may be the result of metastasis; more frequently the affection extends by continuity of tissue, descending along the vas deferens; seizing on the epididymis, and chiefly residing there. In fact, the affection may in strict language be designated as an Epididymitis; although the whole testicle seems to swell, yet the epididymis is the true seat of disorder, and the general swelling depends chiefly on acute effusion of serum into the tunica vaginalis. Pain and a sense of weight are felt in the cord and testicle, the skin reddens, and uneasiness is felt in the groin and loins. The swelling and pain increase, often becoming excruciating; and then sensation in the loins is as if the back were sawn across. Discharge from the urethra diminishes, and ceases—an example, generally, not of metastasis, but of the effect of counter-irritation. The scrotal swelling becomes tense, red, glistening, and intolerant of the slightest pressure; the cord, too, is

Fig. 263.

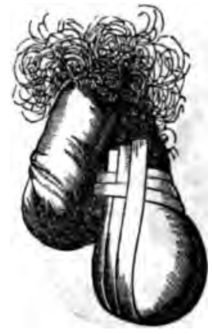


Acute orchitis; attendant on gonorrhœa.

swollen, red, and painful. Febrile disturbance is considerable; and vomiting is both a common and distressing symptom. Sometimes such pain is complained of, in the lower part of the abdomen, as to lead to a simulation of enteritis—and for this the complaint has actually been mistaken.

Treatment requires to be decidedly antiphlogistic; leeching, rest, fomentation, low diet, antimony. Recumbency is essential; and the weight of the tumor must be taken off the cord, by suspension, or by the arrangement of a pillow between the thighs. Opiates, too, are of much service; in full doses, and of frequent repetition. When the body of the testicle is undoubtedly involved acutely, the antiphlogistic use of mercury is both warrantable and expedient; to save, if possible, the delicate structure of the gland. If tension be great, it is well to open a vein in the scrotum; at the same time perforating the tunica vaginalis with the lancet, so as to evacuate the accumulated serum. French surgeons have advised that the puncture should implicate the testis; but this does not seem necessary, the testis seldom being so affected as to require wound for the relief of tension; and it is inexpedient also, on account of the risk of exciting or aggravating intense inflammation there, from which the patient might otherwise have been exempt. As the affection subsides, resolution may be hastened by stimulants to absorption; a solution of the iodide of potassium, with iodine, may be painted on the surface, and pushed to vesication; at a more advanced period, a gum and mercurial plaster may be applied; or pressure may be made by means of adhesive plaster, cut in strips, and applied as if to a limb—the testicle being separated from its fellow, and made to protrude, so as to admit of such application. By some, it is proposed to apply this pressure from the first; but, surely, its proper place is only after the chronic stage has been fairly established. In the acute stage, pressure, however carefully applied, must prove intolerable, or at least must cause aggravation, if the disease be resident in the testicle itself. In the case of epididymitis, there may be a greater tolerance of the application; but still its usefulness as an antiphlogistic is more than doubtful.

Fig. 264.



[Application of adhesive strips. From Curling.]

As the complaint yields, discharge may be expected to reappear at the orifice of the urethra. Very frequently, resolution is incomplete; hardness and swelling remaining in the epididymis. These require active perseverance in the employment of local discutients; and the iodide of potassium may be useful internally. In some cases, resolutive absorption is not only rapid but excessive. The gland, after regaining the normal size, continues to diminish, and may ultimately dwindle down to a mere shred, wholly destitute of the peculiar function.

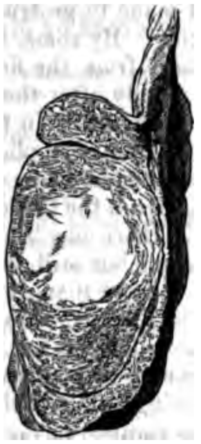
Sometimes *Abscess* forms; but seldom, in gonorrhœal orchitis, unless some casualty or mismanagement have occurred, so as to involve the testis in true inflammation. In simple orchitis, however, the result of direct injury, the occurrence is not so rare. It is attended with much suffering; and the tubular structure of the organ is endangered. An incision must be made as soon as matter has formed; and, in the after-treatment, care must be taken to obviate the tendency to fungous protrusion which the substance of the testicle usually manifests.

Chronic Orchitis, and Fungus of the Testicle.

Chronic orchitis may be the result of an acute attack, imperfectly resolved; or—as more frequently happens—the affection may be chronic from the first; it also may be either primary or secondary—that is, occurring as an independent affection, or as a consequence of gonorrhœa. Very frequently, it depends on stricture of the urethra; not unfrequently it is of syphilitic origin. The body of the testicle is completely involved, as well as the epididymis—though the latter is usually first affected. The swelling, at first irregular, extends from the lower part of the epididymis, and involves the whole organ in a firm, inelastic, uniform tumor, usually of an oval form, and seldom exceeding twice or three times the bulk of the healthy gland. The attendant uneasiness is slight; and after some time, the characteristic sensibility of the organ under pressure is in a great measure lost.

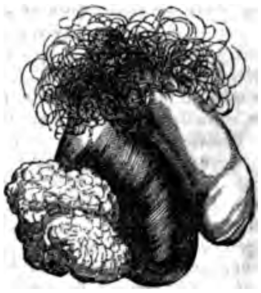
The enlargement is found to depend in part on the deposit of a yellow, cheesy, fibrinous exudation, condensed, non-vascular—intratubular, as well as in the interposed areolar tissue. On making a section of the tumor, after removal, this deposit and its peculiar characters are very apparent.

Fig. 265.



[Vertical Section of a Testicle affected with Chronic Orchitis. (From Curling.)]

Fig. 266.



[Fungus of the Testicle. (From Curling.)]

Slow softening of this deposit may take place; matter is formed; the swelling increases, with subacute exacerbation; the integument thins, and gives way by ulceration; and through the opening the tubular structure protrudes, in the form of a hard, firm, light-colored, comparatively painless, and slowly-increasing fungus. The softening, in such a case, is but partial, and the amount of suppuration slight. Not unfrequently, opening and protrusion take place apparently without the intervention of any such affection; the tunica albuginea gives way, under gradual increase of deposit; the tunica vaginalis becomes adherent, and ulcerates at this point; and then the integument soon yields also. If the opening be small, the protrusion may be proportionally trifling. But, sometimes, almost the whole of the organ projects; its surface studded with granulations, from which a copious thin secretion is discharged.

Chronic orchitis requires the ordinary discussive means for its arrest and removal; and abstraction of the cause, when practicable, is not to be omitted. Simple enlargements of the testicle always lead to a suspicion of stricture in the urethra; and that canal is examined accordingly. If stricture be found, it must be removed, before any amendment can be expected from treatment directed towards the testicle. When syphilis is the originating cause—indicated by the history of the case, large size, and slow progress of the tumor, the concurrence of other syphilitic signs, and nocturnal exacerbations of pain in the testicle—that taint must be combated by the appropriate means; and cautious mercurialism may be required.[1]

In the open condition, when fungus has formed, a slight operation is necessary; the object being to reclaim the fungus—producing absorption of the abnormal deposit, reducing the swelling, and clearing the tubuli. The thickened integument around, constituting the closely adherent margin of the ulcerated opening, is loosened by dissection;

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[1] Authors speak of two forms of syphilitic orchitis: simple and tubercular; the former seldom suppurating, and usually requiring mercury for its cure; the latter often becoming disorganized, and better treated by a combination of iodide of potassium, with gentle mercurials. Mr. Hamilton thus describes these affections:—"In the simple syphilitic sarcocele the testicle will be found enlarged to the size of a lemon or turkey-egg, of an ovoid or pyriform shape, sometimes flattened at the sides; either uniform on the surface, or with the epididymis distinguishable as an irregular ridge along the back; hard, particularly in the situation of the epididymis; heavy, with the integuments of the scrotum of a dusky red; generally neither tender nor painful, except that the hanging weight causes a feeling of uneasiness in the loins and inside of the thighs. In this respect it differs remarkably from gonorrhœal orchitis, where the tenderness is so exquisite and the pain usually so great." "The tubercular syphilitic sarcocele is much more common, and differs materially, both in local and constitutional symptoms, from the simple form. The testicle is enlarged from two to four times its natural size, but the increase of size is generally not remarkable; of very irregular shape, so that the ordinary form of the testicle is often entirely lost, presenting, instead, an uneven, hard, knotty mass, in which it is impossible to distinguish the body from the epididymis. At other times the irregularity is seen to arise from the enlarged and indurated epididymis, which gets of a great size compared to the body of the testicle; that remains but little altered, and readily distinguishable from it. In the gonorrhœal orchitis we well know that the inferior globus of the epididymis is usually the part most enlarged and hard, and often keeps so long after the testicle has recovered; whereas in the tubercular syphilitic sarcocele, I have more frequently met with enlargement of the upper globus of the epididymis, sometimes excessive and disproportioned to the other parts of the testicle. The reason of this may be, that in gonorrhœal orchitis the inflammation extends from the vas deferens at the inferior part of the epididymis to the cellular tissue external to it, with effusion of lymph, causing swelling and induration; whereas in the tubercular syphilitic sarcocele, the swelling of the superior globus of the epididymis depends on the presence of a tubercle imbedded among the vasa efferentia of which it is constituted."—Hamilton, Essays on Syphilis, Dublin, 1849; see also Lancet, No. 1188, p. 620.

and, having been brought completely over the protrusion, is secured by suture. Consolidation takes place; partly by the first, but mainly by the second intention; tendency to protrusion is repressed; and, by the contraction incidental to cicatrization, such pressure is exerted by the integument on the parts beneath, as leads to gradual removal, at least in part, of the abnormal structure. After cicatrization, such pressure may be supposed to continue, in some degree, for a time; and is then to be aided by the discussive means applicable to occult chronic enlargements.

This is infinitely preferable to the old method of shaving off the fungus from time to time, and treating the remaining wound as an ordinary ulcer. The cure was tedious; and, besides, frequent use of the knife in this way was tantamount to castration. By the new method—for which the profession is chiefly indebted to Mr. Syme[1]—cure is accelerated, and the function of the testicle is preserved. A question, however, still remains to be settled: whether the whole of the protruded part is capable of being reclaimed; whether the intra-tubular deposit will wholly disappear, and the tubes everywhere recover their normal state and function. The probability is that, in the outward part of the fungus, disorganization has often advanced too far to admit of this; and that, therefore, this portion—seldom more than a thin slice—may be removed by the knife, before the rest is covered in by raised integument, without sacrificing any recoverable virile power, and with the effect of still further expediting the cure. Often, the operation cannot be performed immediately on the patient's presenting himself; some days of preparatory treatment are usually necessary, that the part may be brought to a clean, granulating, and quiet condition—favorable to adhesive results.

Central suppuration may occur in chronic orchitis. The matter may slowly reach the surface, and be discharged. Sometimes, it remains long stationary, in the condition of chronic abscess. Then the fluid portion of the matter may be absorbed, while the solid part remains in a concrete mass, resembling tubercular deposit; but distinguished from it, by being confined within a distinct cyst—what was the pyogenic membrane.

Scrofulous Testicle.

Tubercular deposit is not uncommon in the testicle; occurring either in aggregated masses, or diffused in the tubular structure, which becomes atrophied under the pressure of accumulation. Such affection is termed "*Scrofulous Testicle.*" The swelling is gradual and very indolent; little pain or uneasiness is felt; the tumor seldom attains to a large size; and the tubercular diathesis is usually indicated by strumous affections in other parts of the body. After a time, one of the prominences enlarges, reddens, and becomes painful; softening and suppuration have occurred there; the integument gives way, and pus and tubercular matter are discharged. The sore presents the ordinary appearances consequent on tubercular softening. Other parts may soften, point, and break; and sinuses communicate one with another. After a time, the greater part of the tubercular matter may be discharged; then the swelling diminishes, and the sores assume a healing tendency. Should any considerable part of the tubular structure have remained entire, it may protrude and form a fungus, as in the case of simple chronic orchitis. This fungus may be repressed in the ordinary way; and solid and permanent cicatrization may occur. But, sometimes, a fistulous opening remains, discharging thin pus, with occasionally also the secretion of the tubuli; and then the condition of *Spermatic Fistula* is said to be established.

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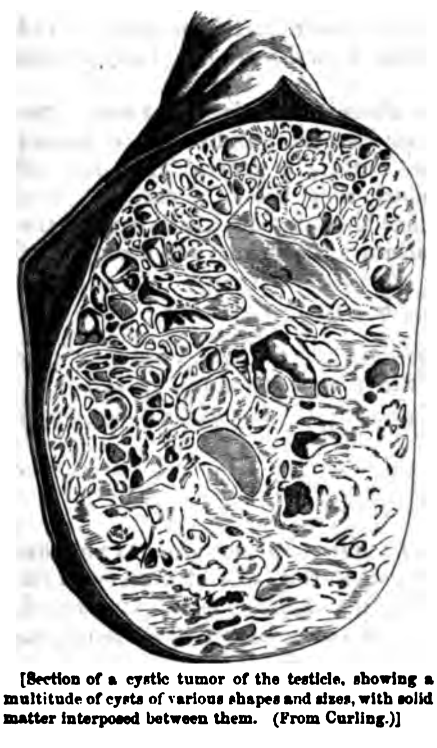
[1] Contributions to Surgery, p. 204, Edin. 1848.

Treatment varies according to the stage of advancement. In the indolent state, discussives are employed, along with antistrumous constitutional treatment, and gradual subsidence of the swelling may result. In the softened state, incision is suitable; for evacuation. If then the amount of deposit and suppuration seem slight, cicatrization is to be attempted. If, however, as is more frequently the case, suppuration and deposit are extensive, it is well to favor speedy disintegration and discharge of the abnormal mass, by free use of the caustic potass. Afterwards, pressure, by strapping, is of much use in favoring closure and cure. Sometimes, the tubercular matter protrudes slightly; but this fungus is readily distinguished from that which is composed of the substance of the gland, by being of less size, soft, crumbling, varying, and temporary. For the one, preservation is suitable; the other requires destructive use of an escharotic. Sometimes the extent of suppuration and disorganization in the part, and the degree of disturbance in the constitution, are such as to call for more summary procedure; and, to save the system, the part has to be sacrificed, by castration.

Fig. 267.



[Section of a cystic tumor of the testicle, showing a multitude of cysts of various shapes and sizes, with solid matter interposed between them. (From Curling.)]

In the indolent stage of scrofulous testicle, and during the progress of simple enlargement dependent on chronic orchitis, it is not uncommon for serum to accumulate in greater or less quantity; masking the character of the tumor, and increasing its apparent bulk. It is detected by softness, translucency, and fluctuation. If the accumulation prove considerable, occasional removal by tapping is of use; permitting the discussive applications to act more efficiently on the solid enlargement.

Tumors of the Testicle.

These were wont to be included under the general term *Sarcocele*. The most common is the simple enlargement dependent on chronic orchitis. The scrofulous tumor is not uncommon. Occasionally the fibrous tumor is found. Cystic sarcoma is as frequently formed here as in any other situation. Carcinoma and cancer are not of frequent occurrence. Cephaloma has no more frequent site; sometimes, though rarely, it is combined with melanosis; and sometimes the open medullary tumor degenerates into the condition of Fungus Hæmatodes.

These tumors present the ordinary characters, and require the ordinary treatment. The simple enlargements are capable of discussion. The strumous tumors may be either discussed or disintegrated. The rest can be removed only by castration. Prognosis, in the case of malignant formations, may be more favorable here, than at any other site.

Irritable Testicle.

This term is usually made to include mere increase of the sensibility of the organ, as well as decided neuralgia. The former is almost always dependent on some affection of the urethra, bladder, or kidney, or on disorder of the general system; and is to be remedied accordingly. But it may—like the tumid and sensitive breast of the female—be the temporary consequence of change at puberty; and it may also follow mere excess in venereal excitement.

The latter is a formidable disease; inasmuch as it is attended with great suffering, and is but little amenable to any treatment. Uneasiness is almost constant, the part is tender to the touch, and violent pain comes in paroxysms. There is little or no elargement, or other morbid indication in the organ; in general, it is intolerant of pressure and manipulation; and during the paroxysm, it is retracted close upon the groin. The patients most liable to suffer from such affections are the weak, nervous, and dyspeptic; more especially if they have indulged in venereal excess. Occasionally the affection is combined with cirsocele; and seems to depend on that morbid condition of the veins. But, in general, the origin of the affection is equally obscure as in most other cases of neuralgia. The treatment is such as is generally applicable to this disease. Among the more successful local applications, aconite, belladonna, and nitrate of silver may be mentioned; among those used internally, iron, and the liquor arsenicalis. Frequently but little improvement follows the most skilful management; and the patient may be driven by his sufferings to demand castration. This request is seldom if ever to be complied with, however; inasmuch as the neuralgia is likely to return, in the cord; being not dependent on any local causes capable of being removed by the operation.

Atrophy of the Testicle.

Gradual wasting of the testicle may follow acute orchitis, as already noticed; and a blow or squeeze may result in this, with the intervention of a slight inflammatory process.[1] It is not uncommon for atrophy of the testicle to supervene on cirsocele. The pressure of hydrocele, too, would appear in some few cases, to cause diminution of the gland; and the same result has followed the pressure of fatty or other tumors. Continence, and the prolonged use of iodine internally, are supposed to tend to atrophy; but the truth of the supposition seems more than doubtful. Suppuration of the testicle may cause disorganization of part of the tubular structure, with obstruction and consequent absorption of the remainder. Atrophy of one or both organs, it has been supposed, has followed injuries of the head. Occasionally, examples of the affection occur while no exciting cause can be assigned.

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[1] Squeezing of the testicles is a mode of castration in oriental courts; complete atrophy being found to result. And the same method is applied to the lower animals; bucks for example.

Obviously, but little is in our power in the way of treatment; except by removal of the cause, when that is practicable. In the case of cirsocele, for example, if we succeed in curing this, wasting of the testicle may be expected to cease. Restoration of the normal bulk, however, is scarcely probable.

Hydrocele.

The term denotes chronic accumulation of serum, in connection with the genital organs; and this may occur in more than one site; in the tunica vaginalis, in the cord, or in the sac of a hernia.

1. *Hydrocele of the Tunica Vaginalis Testis.*—There is no more common disease. It may follow on injury, and a minor amount of orchitis; sometimes it is attributed by the patient to a strain; very frequently there is no assignable cause. Swelling takes place slowly, and with little or no uneasiness; ascending from the lower part of the scrotum upwards. The tumor may ultimately attain to a large size, encroaching closely on the groin. It is of pyriform shape, except when much distended; and then the narrowness of the upper part is undone by expansion there. It is translucent, unless the coverings be preternaturally thickened. Fluctuation can be felt, unless distension is great. The testicle usually occupies the back of the cavity, near the middle—nearer the lower than the upper part; and seldom can be felt distinctly. On grasping the tumor firmly at that part, however, a hard substance may be felt; and the patient experiences the peculiar sensation which compression of the testicle is calculated to produce. However translucent the rest of the swelling, at that part it is opaque. Sometimes the testicle is situate in front; and then can be felt distinctly. It is never found at the lower part of the scrotum, and separate from the general swelling, as in hernia. The finger and thumb can always be carried above the tumor, at its neck; and the spermatic cord can be felt free. The tumor has no impulse afforded to it, on coughing, or during any other exertion of the abdominal muscles; unless there be a communication between the cavity of the tunica vaginalis, and that of the abdominal peritoneum—as in the case of congenital hernia. The accumulation generally consists of a straw-colored serum; and sometimes loose solid bodies are found, as in serous cysts elsewhere. The tunica vaginalis is, in general, merely distended; sometimes it is thickened; sometimes it is intersected, so as to constitute minor cysts. In simple hydrocele, the testicle and epididymis are structurally sound. Not unfrequently, however, they are the subject of chronic enlargement; and then the disease is technically termed *Hydrosarcocele.*

The treatment of hydrocele is either palliative or radical. The former consists in simply withdrawing the fluid, by tapping; the swelling and uneasiness are removed for a time; but they return, and sometimes rapidly. The latter treatment consists in withdrawing the serum, and injecting a stimulant fluid instead, whereby an acute congestion may be established, whose resolution, when complete, shall have the effect of restoring the normal balance between exhalation and absorption. Simple tapping may be performed by the thrust of a lancet; the flat end of a probe being afterwards used to keep the wound open, during the flow of serum, if necessary. Or a flat trocar and canula may be employed.

When injection is contemplated, a round trocar and canula are to be preferred. The patient is placed erect. The surgeon, grasping the tumor firmly behind, with his left hand, renders it tense and prominent in front; then the instrument is entered, perpendicularly; afterwards it is passed obliquely upwards, so as to avoid wound of the testicle, and yet taking care that the obliquity is not such as endangers separation of the coverings of the sac, and non-entrance into the sac itself. The serum having been withdrawn, a caoutchouc bottle, with stop-cock and nozzle, is adapted to the canula—or a syringe is employed; and the cavity is partially filled with some stimulant fluid. Port wine, undiluted, or a solution of the sulphate of zinc, used to be much employed. Now, the favorite injection is iodine, in solution; one part of the tincture to three of water. Or, a small quantity of pure tincture of iodine having been thrown in may be permitted to remain permanently in the sac—disappearing ultimately by absorption.[1] If the dilute injection be used, three or four ounces are injected; and are temporarily retained, by withdrawing the bottle or syringe, and turning the stopcock of its nozzle—which is left pendent from the canula. After waiting a few minutes the patient will begin to feel pain in the testicle, shooting up the cord into the loins; and a sensation of faintness will probably come upon him. Then the stopcock is opened, and the fluid drains away. The patient is put to bed, with the scrotum supported. If the subsequent inflammatory process threaten to be excessive, fomentation is applied, and antimony may be given internally. The tumor re-forms quickly, with heat and pain; sometimes the acute accumulation seeming greater than the first. By and by, recession gradually occurs; the tumor subsides; the pain ceases; and, in eight or ten days, we may expect to find the parts restored, permanently, to their normal state. It has been proposed to retap, for evacuation of the acutely effused serum, and thus to abridge the period of cure; but this seems to be, in most cases, unnecessary.

It is very seldom that the operation fails. Should it do so, it is to be repeated with a stronger stimulant. The method by pure tincture of iodine, allowed to remain, is then specially suitable.

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[1] Iodine injection was first used by Dr. J. R. Martin, of India. The form employed was ʒj of tincture of iodine to ʒiii of water. Of this, in ordinary hydroceles, a small syringeful was thrown in and retained; in large swellings two syringefuls were used. His experience extended over upwards of 2000 cases in the Native Hospital, Calcutta; and failures were under one per cent. His first operation was in March, 1832. His first publication on the subject was in the Transactions of the Medical and Physical Society of Calcutta, 1834. *Vide*, also, Paper read before London Med. Chir. Society, Nov., 1841, published in the Lancet, Nov. 20, 1841; and Paper in Lancet, April 30, 1842.

Before injecting any stimulant, it is most necessary that the surgeon satisfy himself that the point of the canula is fully within the cavity of the tunica vaginalis; otherwise, injection of the areolar tissue of the scrotum may take place, followed by sloughing, and severe constitutional disturbance.

Fig. 268.

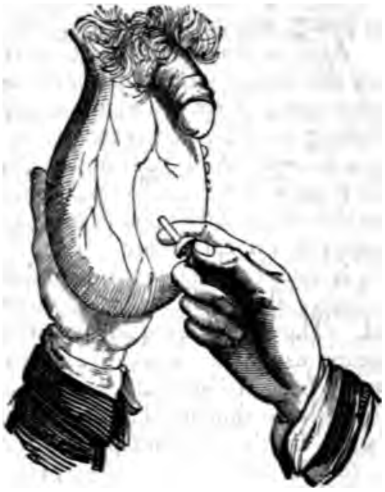


Fig. 269.

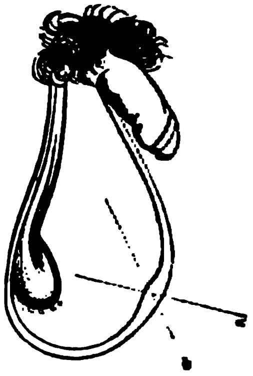


Fig. 268. Operation of tapping hydrocele; the trocar entering.

Fig. 269. Diagram showing the direction of the trocar; *a*, the direction of perforating, to avoid splitting of the parietes; the direction afterwards changed to *b*, to avoid wound of the testicle.

A case of hydrocele presenting itself, injection cannot at once be determined on. It is first necessary to ascertain whether the testicle is sound or not; and this cannot be done until the serum has been discharged. If the organ be then found in its normal state, injection may at once be proceeded with. Otherwise, it must be delayed; we are first to turn our attention to cure of the chronic enlargement; and, after that has been accomplished, the radical operation may then be undertaken. When the testicle is diseased, the accumulation of serum is but a symptom of this affection, and is to be treated accordingly. The palpable cause of the redundant secretion must be removed; otherwise, reproduction can scarcely fail to occur. For the radical cure, by injection, is not effected by gluing the serous surfaces together, and obliterating the cavity of the tunica vaginalis, as was at one time supposed. The inflammatory process seldom advances to plastic exudation; and the cure is simply by restoring normal function in the membrane.

A hydrocele of very large size is not at once to be injected, though the testicle be sound. It is simply tapped; and when, by reaccumulation, an average bulk has been attained, then the radical cure is to be proceeded with.

The painful operations by seton, caustic, and incision are now fallen into complete desuetude. Of late, it has been proposed to operate by acupuncture; making small openings with a needle, through which the serum may gradually escape, partly externally, but chiefly into the areolar tissue—thence to be absorbed. The mode is tedious and uncertian; but being safe, and little painful, it may be had recourse to when the patient decidedly objects to the ordinary treatment by injection.

Children are liable to hydrocele. And in them treatment is very simple. We may succeed in dispelling the fluid, by discutient lotions—such as a solution of the muriate of ammonia; or by the external application of iodine, used cautiously. Failing in this, the serum is to be evacuated by the simple puncture of a lancet. And this, in the great majority of cases, is sufficient to effect a radical cure. The part swells, reddens, and is painful, as after injection in the adult; and, on resolution being completed, the parts are found in a normal state.

By the term *Congenital Hydrocele*, is usually understood a condition of parts such as leads to congenital hernia; the vaginal process of peritoneum not having become obliterated. The fluid consequently communicates with the cavity of the peritoneum, usually by a small aperture; and may be made to disappear gradually from the scrotum, by pressure upwards. In treatment, the first object is to shut up the vaginal process; and this may in general be effected, by the constant pressure of a truss. In the child, this may suffice for the whole cure; absorption of the fluid being afterwards hastened by discutient applications. In the adult, the ordinary treatment may be necessary; but never is injection to be had recourse to, until we are satisfied that all communication with the peritoneum has been completely obliterated. To obtain this result, use of the truss is also important in another point of view. The testicle is liable to injury; by slight injuries the inflammatory process may, at any time, be lighted up in the tunica vaginalis; and, from thence, extension to the abdominal peritoneum will be easy and direct, unless the communication have been closed.

By *Encysted Hydrocele* is understood, an accumulation of serous fluid within a cyst, or cysts, independent of the cavity of the tunica vaginalis. Such adventitious formations are usually found connected with that portion of the tunica vaginalis which covers the epididymis; but they may arise in connection with any part, either of that membrane or of the tunica albuginea. The growth is more irregular than in common hydrocele, and the tumor seldom attains to a large size; the testicle is situated sometimes in front, sometimes on the lateral aspect; sometimes at the bottom; seldom on the back part, as in the common form; and the fluid is generally paler and less albuminous, than that which is found in the tunica vaginalis. When the bulk is such as to occasion inconvenience, tapping is had recourse to; and, if nothing contra-indicate, injection may be practised. Should this fail—as is not unlikely, in the case of a plurality of cysts—a seton may be introduced, and retained until consolidation has occurred.

The tunica vaginalis has been found the site of much calcareous deposit, and filled with turbid fluid containing cholesterine. In such a case, cure can result from nothing short of free incision; and, after all, castration may not improbably be required.

Spermatozoa are sometimes observed in fluid withdrawn from hydrocele; and such fluid is usually of a milky appearance. It seems uncertain whether these have escaped from an accidental wound or giving way of the tubular structure, either of the testicle or of the epididymis; or whether the cyst, from which they are derived, has been formed by dilatation of a part of the tubular structure—as takes place in lacteal tumor of the breast, and in ranula. Whatever their origin, their presence is not found to contra-indicate the ordinary cure by injection.

Hydrocele and hernia may coexist; and, as the former enlarges, the cord and abdominal aperture may come to be so occupied and compressed as to prevent hernial descent. A hydrocele, thus enacting the part of a truss, need not be interfered with, unless productive of much inconvenience by its weight and bulk.

II. *Hydrocele of the Cord.*—This may be either diffuse or encysted. The *Diffuse* form is comparatively rare. A serous fluid accumulates in the areolar tissue of the cord, and is enclosed in a distinct sheath; this again is covered by the cremasteric expansion. The swelling is seldom of large size; uniform, and somewhat pyramidal; of slow formation; and not attended with any considerable uneasiness. The base rests on the point where the spermatic vessels join the testicle, and is separated from the tunica vaginalis by a dense septum; hence, the testicle is felt, distinct, in its ordinary site. If the abdominal aperture be not encroached upon, there can be no difficulty in diagnosis; but, when the swelling extends within this, it is apt to be mistaken for omental hernia. The chief points of difference are, the completeness in reduction of the hernia, the clearness of the cord after reduction, and the impulse given upon coughing: in the hydrocele, also, fluctuation is in general tolerably distinct. The fluid has been found reducible within the abdomen, but not into the abdominal cavity; passing up along the spermatic cord—probably in its areolar tissue—and, when past the abdominal ring, forming a distinct tumor in the abdominal parietes.

Unless the swelling prove large and inconvenient, it need not be interfered with. The best mode of cure, probably, is acupuncture, aided by local discutients. The punctures are made at the lower part of the tumor, and need not be numerous; for the fluid readily escapes from space to space; and, not unfrequently, these are broken down into larger compartments.

Encysted hydrocele of the cord is the more common variety. The serous fluid is contained within a distinct cyst; sometimes of adventitious formation; sometimes formed of an unobliterated portion of the vaginal process of peritoneum. Growth is slow and painless. The tumor is circumscribed, oval, tense, and fluctuating; often plainly translucent; always movable on the cord. The testis is felt distinctly separate. And no difficulty in diagnosis exists, unless, as sometimes happens, the swelling extend within the abdominal parietes. In general, however, the tumor can be pulled down from the abdominal aperture, permitting the cord to be felt free above; and, besides, the tumor can never be wholly reduced within the abdomen—a certain degree of tense fulness always remaining in the upper part of the canal. In the child, this affection will disappear under discutients. In the adult, it seldom demands interference. If it should, it may be got rid of by tapping and injection; or a seton may be temporarily applied.

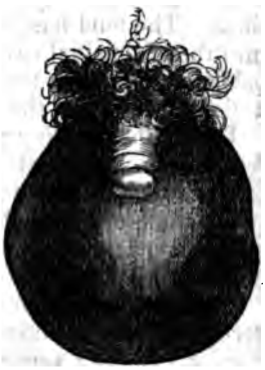
III. *Hernial Hydrocele.*—When a scrotal hernia has been reduced, and the neck happily becomes obliterated, the sac, remaining, may be filled by serous accumulation. A pyramidal, fluctuating, and translucent tumor will result; of easy diagnosis; and amenable to the same treatment as an ordinary hydrocele. The affection is of rare occurrence.

IV. *Hydrocele in the Female.*—The term Hydrocele is applied to an œdematous state of the round ligament; analogous to diffuse hydrocele of the cord in the male. Also, a prolongation of peritoneum, along the round ligament of the uterus, may remain in communication with the abdominal cavity, by means of a narrow aperture at its neck; and this pouch may become the seat of serous accumulation, constituting a tumor analogous to congenital hydrocèle of the male. Besides, the round ligament is liable to be the seat of cystic formation; analogous to encysted hydrocele of the cord in the male. The affections are rare; and seldom require active treatment.

Hæmatocele.

This may be the consequence of external injury; or it may be of spontaneous occurrence. By the term is understood an accumulation of blood, in one of three localities: the areolar tissue of the scrotum, the areolar tissue of the cord, and the tunica vaginalis.

Fig. 270.



Hæmatocele of the scrotum.

1. *Hæmatocele of the Scrotum* is the result of bruise, or oblique wound; and is analogous to an ordinary bruise, both in nature and in treatment. The scrotum swells, and is discolored; the hue is blackish, like that of urinous infiltration; but the diagnosis is easy, by attention to the history of the case—also noting that there are none of the signs of gangrene present, and that the system is comparatively unaffected. The treatment consists in arresting the inflammatory process and afterwards favoring absorption of the extravasated blood by local sorbefacients. Incision is withheld, unless suppuration have unfortunately occurred.

2. *Hæmatocele of the Cord.*—A spermatic vein may give way, under external injury, or great bodily exertion; and extravasation into the areolar tissue will result, forming a tense, discolored tumor there. The treatment is as for the preceding variety.

3. *Hæmatocele of the Tunica Vaginalis* is the most common form; and to it, in strict accuracy, the term may be limited. The blood is extravasated into the cavity of the tunic; and may be associated, or not, with hydrocele. By wound in the testicle, in tapping—or by a blow or other external injury, or by the spontaneous giving way of a bloodvessel—a hydrocele may at any time be converted into hæmatocele. The tumor suddenly increases in size, and is the seat of pain; and, when

handled, is found heavier, and less fluctuating than before. The blood, if in small quantity, becomes diffused in the serous fluid; when copious, a portion coagulates, and assumes the fibrinous arrangement. This, acting as a foreign substance, may excite inflammation; and suppuration may take place, with much increase of swelling and pain. Very frequently the affection is associated with chronic enlargement of the testicle—Hæmato-sarcocele.

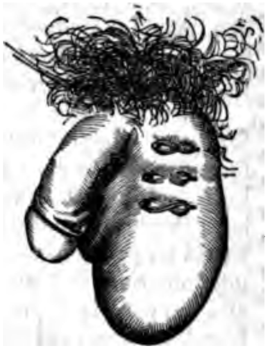
When hæmatocele is unconnected with hydrocele, the treatment is as for other simple extravasations—antiphlogistic and sorbefacient; the formation of matter being the only indication which requires use of the knife. When the extravasation supervenes on hydrocele, simple tapping is in the first instance to be had recourse to. To inject then, however, would be productive of no good result; and, very probably, would cause inflammation and suppuration. The fluid is allowed to collect again; and tapping is repeated. After several withdrawals, the fluid may be found once more of the same character as in simple hydrocele; and then injection may be proceeded with, not only in safety, but with a good prospect of success—provided the testicle is sound. In the confirmed cases —and more especially when suppuration is already threatened—the only mode of obtaining a radical cure is by free incision; laying the cavity fully open, turning out the coagula, and obtaining closure of the gap by granulation; care being taken to avoid wound of the testicle. If the tunica vaginalis be found thickened, and otherwise much altered, the greater portion may be cut away; as thus the amount of suppuration, and the period of cure, will be materially abridged.

Cirsocele.

A varicose condition of the veins of the spermatic cord is termed Cirsocele, or Varicocele. The pendent nature of the part predisposes to this affection. And the ordinary causes are such as favor varix in general; especially constipation, and laborious exertion in the erect posture; as also tumors, trusses, and whatever causes obstruction to upward flow in the cord. The left side is much more frequently affected than the right; the left testicle usually hanging lower than the right; and the left spermatic vein being not only longer in its course, but also more exposed to compression by fecal accumulation in the sigmoid flexure of the colon. The swelling is usually pyriform; with its base on the testicle, its apex upwards; and, on manipulation, the veins can be distinctly felt rolling under the fingers, like cords or earth-worms. There is a sensation of weight and uneasiness in the part; the testicle may be the seat of neuralgia, sometimes it becomes atrophied. An aching sensation in the groin and loins is not unfrequent. Sometimes the swelling proves very inconvenient, from its mere pendulousness and bulk; as in saddlers and others, who require close approximation of the thighs in their vocational labor—and in those who are much on horseback. Occasionally, a mental despondency is observed, greater than the bodily ailment would seem to warrant.

Treatment is palliative or radical. The former consists in avoiding or removing the more obvious causes of the affection, keeping the testicle well supported by a bandage, and bathing the parts frequently in cold water. When the integuments of the scrotum are very redundant, the testicle may be retained in close contact with the groin, by invagination of the loose integument through a padded metallic ring. Or such trussing may be more effectually maintained, by removing the redundant skin by incision; support of the testicle being then intrusted to the cicatrix.

Fig. 271.



[Veins compressed by needles and ligatures. (From Fergusson.)]

When the testicle is suffering either by neuralgia or by atrophy, or when much uneasiness and discomfort are experienced, eradication of the disease is naturally sought for. With this view, the varix may be treated here as elsewhere—by obliteration of the veins. 1. The actual cautery may be used; a heated wire being applied to the veins, isolated and fixed between the finger and thumb. The practice is safe and effectual, but the formidable nature of the application is a serious objection. 2. The veins may be compressed by suture, applied on needles passed beneath them by transfixion; as in ordinary varix. Care being taken to exclude the vas deferens and the spermatic artery. Obstruction of the duct is tantamount to castration, and obliteration of the artery can hardly fail to be followed by atrophy of the testicle. 3. The operation of M. Vidal may be performed. The varicose veins, having been separated from the rest of the

Fig. 272.

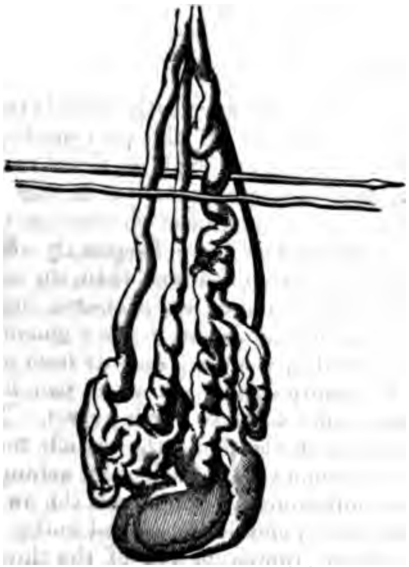
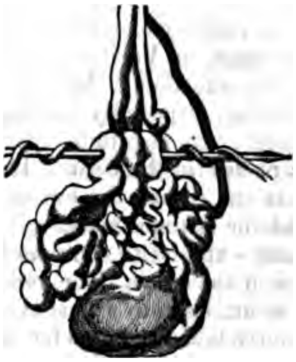


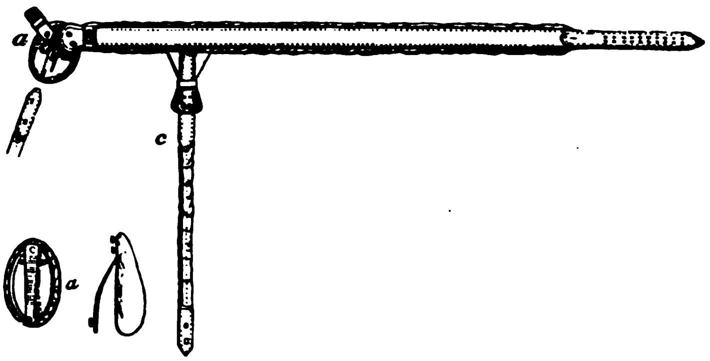
Fig. 273.



[Vidal's Operation for Varicocele.]

cord, are placed between two silver wires, passed by the transfixion of needles, and emerging at the same openings. By twisting together the ends of the wires, the interposed veins are compressed; and, by a continuance of the twisting, they are rolled up round the wires, while at the same time the testicle is somewhat elevated. The ends are then secured, on a roll of bandage placed on the integument. By further twisting of the united ends, by means of a turnstick, the compression and twisting of the veins are gradually increased; and this is continued, until the wires free themselves by ulceration—thus declaring section and obliteration of the veins to be complete. 4. Obliterative pressure may be maintained on the veins at the groin, by means of a spring truss. But this, for obvious reasons, is not advisable. Moderate pressure there, however, is found very serviceable, not merely palliating, but sometimes obtaining cure; probably by affording support to the veins, while they are at the same time relieved from the superincumbent weight of blood. Such moderate pressure is best applied by a light and accurately fitted truss.[1] [The truss recommended by Mr. Curling is here represented. It "consists of a pelvic band, to one extremity of which a pad (*a*) is attached. This pad is stuffed with moc-main, a species of cotton, and covered with India rubber or chamois leather. It must not be made too conical, so as to separate the veins. A lever spring is acted on by a thigh strap (*c*), which passes from the pelvic band behind up the inner part of the thigh, and is attached to a button at the extremity of the spring. The degree of pressure is regulated by the tightness of this strap. If the thigh straps be made of strong, elastic webbing, for about three inches behind, it will yield to the movements of the body, and add much to the comfort of the patient. In double varicocele, pads must be attached to both extremities of the pelvic band, and two thigh straps are required. Being made without any circular spring, this instrument is not so liable to be displaced as the ordinary trusses. The patient can readily regulate the pressure of the pad, increase or diminish it as may be necessary; whilst

Fig. 274.



[Curling's truss for Varicocele. (From Curling.)]

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[1] Curling on the Testicle; and Thomson, Monthly Journal, Nov. 1848, p. 295. "Evans' moc-main lever truss" is very suitable.

the pad itself, being stuffed with a light and elastic material, allows of the requisite pressure being made without causing discomfort" (Op. citat. 2d Am. Ed. p. 366.)] One great advantage of such treatment is its simplicity, and freedom from risk by phlebitis.

A variety of varicocele occasionally occurs, affecting the veins within the inguinal canal, and at the groin; while those of the scrotum are comparatively free. It is very liable to be mistaken for hernia, as formerly noticed. The best test is the peculiar sensation imparted to the finger and thumb when the part is pinched and rubbed. Palliative treatment usually suffices. But should a radical cure be sought, the preferable means is the application of pressure by a truss.

Occasionally, adipose tumors form in the areolar tissue of the spermatic cord. Their bulk is inconvenient, and their pressure may cause atrophy of the testicle. They are to be removed by incision. Fibrous tumors and osseous formations have also been found here; but are rare. The testicle, arrested at the groin, in its descent, may become affected by tumor; and in that situation may require removal by operation.[1]

Castration.

This severe and painful mutilation is seldom required, except for tumors of the testicle; malignant, or such as, though simple, are not amenable to either discussion or disintegration. In neuralgia of the testis, and in cirsocele, it is sometimes demanded by the patient; but in neither case is the surgeon warranted in acceding to the wish.[2]

All hair having been removed from the scrotum and groin, the patient is placed recumbent. By grasping the tumor behind, the skin is made tense. The bistoury is entered at the neck of the swelling, and carried to its fundus; diverging over the body of the tumor, so as to include a sufficiency of skin within an elliptical incision. This form of wound is especially necessary, when a fungus, ulcer, or other involvement of the skin requires to be taken away. A simple rectilinear wound would suffice for removal of the tumor; but a redundancy of skin would be left, constituting a pouch for untoward accumulation of blood or pus. On the other hand, it is very necessary to avoid excessive removal of the skin, lest, on contraction, a bare sufficiency be found for effectually covering the remaining organ. And, in connection with this, it is important to remember that the covering of a large sarcocele is borrowed from the adjoining parts; and that, consequently, after incision, a great degree of resilience in the integument is certain to occur. The dissection is advanced, first at the upper part of the wound, so as to expose the cord; this, having been isolated, is intrusted to the firm grasp of an assistant, to prevent retraction within the abdominal aperture; and then it is cut across. The apex of the tumor being now everted, dissection is rapidly proceeded with—a dissection rendered comparatively painless and bloodless, by early section of the cord. Care is taken not to wound the septum, and thus to expose the sound testicle. The arteries of the cord are then tied. And, should they have slipped from the fingers of the assistant, an upward enlargement of the superficial wound may be required. The scrotal vessels are secured with especial care; experience warning us that, otherwise, troublesome bleeding after reaction is almost certain to occur. The wound is brought together, and treated in the ordinary way. The lower part seldom heals but by granulation; and, therefore, need not be closely approximated. The cord requires to be carefully watched; diffuse suppuration being apt to occur there; and should this threaten, early incision must be had recourse to.[1] But, by suitable antiphlogistic precautions, all necessity for resumed use of the knife may generally be avoided.

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[1] Lancet, No. 1214, p. 617.

[2] Castration may seem expedient in Hermaphrodism.—Monthly Jour., Dec. 1852, p. 573.

It is important to remember that, like hydrocele, sarcocele may coexist with hernia; and that the latter may be temporarily restrained by the bulk of the tumor of the testicle. On removal of this, however, the hernia, descending during the cries or straining of the patient, may appear at the wound.

Impotence.

This may depend on imperfect development of the testis; but not on imperfect descent. The organs are as efficient, functionally in the abdomen as in the scrotum. Ablation and atrophy of both organs cause impotence; but either testicle may be lost with comparative impunity. The oxalic diathesis, and diabetes, diminish the sexual appetite and power; and so does the phosphatic diathesis, to a less degree. The pressure of hydrocele may cause impotence, even without atrophy of the testicle. Affections of the brain are sometimes followed by it. In the newly married, a temporary loss of power is sometimes caused by mere predominance of mental emotion. Excessive venery, inducing an irritable state of the whole genital system, is perhaps the most frequent cause. Effete *roués* thus "read their sin in their punishment."

Cure can be expected, only in those cases which are unconnected with structural change in the testicles. The cause having been removed, certain medicines are supposed to have a tendency to restore this animal function, and are hence termed Aphrodisiacs. Of these, the most important are, Indian hemp, conium, and phosphorus; the two former most suitable in cases of irritability; the latter given in very guarded doses, for the more chronic examples. Musk, cantharides, steel, and other tonics may also be of service; and diet should be generous. The marital and mental cases may be left to work their own cure.

Spermatorrhœa.

An irritable state of the testicles, and seminal vesicles, bladder and urethra, with a turgid and especially irritable condition of the prostatic portion of the urethra, leads to involuntary and frequent emission of the seminal fluid. By much the most frequent cause of this morbid state is masturbation; and, next in order, comes excess in venereal indulgence. Stricture, prostatic diseases, and irritation communicated from diseased rectum, are common causes of minor forms of the affection. In consequence of the irritability, an impression much inferior to the normal stimulus suffices for production of seminal discharge. Slight venereal excitement, by day or night, causes emission; and semen is also discharged during straining at stool, and by effort of evacuating the last drops of urine in micturition. The testicles are soft, and hang low in the scrotum, which is loose and flabby. Impotence results; by incapacity of erection, as well as by reason of preternatural haste in emission, and by the vitiated character of the secretion itself. The digestive organs become deranged; the general health fails; many anomalous sensations are felt, and many serious diseases are simulated; a dejected expression of countenance is acquired; and the air and bearing are those of a poltroon.

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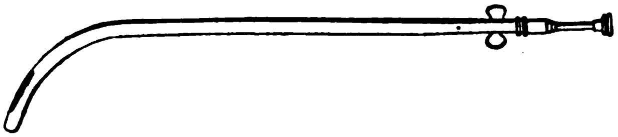
[1] To avoid the risk of such inflammation being excited by unnecessary pressure of the assistant who grasps the cord, it is often well to tie the artery at the moment of the cord's division; so superseding the necessity of pressure there altogether.

The principles of treatment are obvious. Chastity in thought, word, and deed; cold bathing, and a tonic system of treatment; regulation of bowels, but avoidance of purgatives, or other sources of local irritation and general exhaustion; early rising, cheerful society, and healthful occupation of body and mind. If the irritability continue, nitrate of silver may be applied to the posterior part of the urethra, by means of the porte-caustique of Lallemand.[1] This instrument having arrived at the tender part—which is at once indicated by the feelings of the patient—has the stylet projected, so as to expose the caustic; and, by gently turning the instrument, an efficiency of application is insured. Afterwards, strict rest, with antiphlogistic regimen, should be maintained for a day or two; and, if need be, sedatives are given, either by the mouth or by the rectum. [Various modifications of this instrument have been proposed, the chief objects of which have been to lessen its dangers, and to facilitate its application. Among these the one recommended by Dr. Gross, for stricture, and here represented, may be preferred as the simplest, most convenient and safest. "It is fashioned like a common silver catheter, and is either straight or curved, according to the situation of the stricture. At the posterior surface of its vesical extremity is an eyelet, about three-quarters of an inch in length

Fig. 275.



[Instrument for Cauterising the Prostatic Portion of the Urethra. (From Gross.)]

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[1] This instrument "consists of a straight or curved platina canula or tube, rather smaller than a middle-sized catheter, through which plays a caustic-holder; in the further extremity of which there is a narrow groove, eleven lines in length, for the purpose of holding the caustic. After filling the groove with the nitrate of silver, by fusing it over a spirit lamp, it becomes so securely fixed, that there is no longer any danger of it escaping. At the other end there is a sliding screw or stop, by which the action of the remedy may be limited to any extent less than the groove which contains it. Another sliding stop affixed to the canula serves, after the distance of the orifice from the part to be cauterized has been ascertained, to prevent the instrument passing further into the canal. [See Fig. 260, p. 526.]

by two lines in width, which corresponds with the caustic in the cup, attached to the rod in the interior of the tube. The cup is partially filled with tallow, soap, or extract of hyoscyamus, which is next sprinkled with a thin layer of the powdered salt, when it is fit for use. This method is much better than that of melting the caustic into the cup, as is generally done, over the flame of a spirit lamp." Dr. Gross objects to Lallemand's porte-caustique, because the projected stylet is liable to break off in the urethra, as it certainly has done in repeated instances. With regard to this, it may be said that, in these cases, the stylet should *never be protruded*; but, whenever possible, the canula should be introduced sufficiently far, and then *withdrawn a little*, so as to expose the caustic-holder to the diseased surface.] Repetition may be required, after a considerable interval. In mild cases, the occasional introduction of a common metallic bougie may succeed in removing the irritability; rendering recourse to the more painful and hazardous cauterization unnecessary. Cold enemata, and counter-irritation in the perineum may be of service. Compression of the urethra, by a pad applied to the perineum, has also been found useful.[1]

This obscure and distasteful class of cases is still much in the hands of unprincipled practitioners and quacks. This is no reason, however, for leaving the unfortunate victims in such a predicament, or for denying the existence of such affections. Acknowledging the disease, it seems plainly the duty of our science and art to afford what assistance may be in our power; at the same time remembering, that without strict purity of conduct on the part of the patient, all treatment will prove of little avail.

It is also most important to remember, that many alleged cases of this affection are mere simulations; urethral or prostatic gleets; or conjurings of the patient's own fancy—a common form of hypochondriasis; or the suggestion and imposition of cunning and unprincipled men.

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[1] Ranking's Retrospect, vol. ii. p. 118. See also, on this subject, Lallemand, Des pertes séminales involontaires, Paris, 1842. Brit. and Foreign Review, April, 1843, p. 346. Phillips, Med. Gazette, Jan. 1843. Civiale, Mémoire sur l'Emploi des Caustiques dans quelques Maladies de l'Uretre, Paris, 1842.

On Diseases of the Testicle, see Warner, An Account of the Testicles, their Coverings and Diseases, Lond. 1774. Pott, A Treatise on the Hydrocele, &c., in his Chirurgical Works, vol. ii. Lond. 1783. Benjamin Bell, a Treatise on Hydrocele, &c., Edin. 1794. Earle, A Treatise on Hydrocele, Lond. 1796. Ramsden, Practical Observations on the Sclerocele, &c., Lond. 1811. Astley Cooper on the Structure and Diseases of the Testis, Lond. 1830. Russell, Observations on the Testicles, Edin. 1833. Curling, A Practical Treatise on Diseases of the Testis, &c., Lond. 1843. [Curling, Op. citat., 2d Am. from 2d Revised and Enlarged Eng. Ed. 1856. See also, Gross on the Urinary Organs, p. 786.]

CHAPTER XXXVI.

AFFECTIONS OF THE SCROTUM AND PENIS.

Erysipelas of the Scrotum.

ERYSIPELAS not unfrequently attacks the scrotum, in a distinct and marked form; peculiarly asthenic in its type; partaking much of the characters of diffuse areolar infiltration. It occurs in adults of weak and broken down system, given to drink and other dissipation; and usually follows a kick, blow, or other injury. Swelling is great and rapid; with marked symptoms of constitutional irritation from the commencement. Thin, unwholesome matter speedily forms, and is diffused into the areolar tissue. The skin—at first red, tense, and glistening—blackens, or assumes a tawny hue, shrivels, and becomes cold and fetid. Sloughing is begun and advancing. Very frequently, the groins are involved; and the mischief extends upwards in the abdominal parietes. The constitutional symptoms soon pass from the irritative into the typhoid type; and fatal sinking follows. Local and general safety can be obtained, only by early and active interference. Often the chalybeate treatment is found specially successful.

Erythema may occur at any time in the scrotum, under the ordinary exciting causes. It follows the ordinary course, and requires the ordinary treatment.

The areolar tissue of the scrotum is very liable to œdema; occurring sometimes as a distinct affection; much more frequently a concomitant of general anasarca. When excessive, relief and diminution may be obtained from a few dependent punctures; made cautiously, however, lest asthenic and diffuse inflammation ensue.

Elephantiasis of the Scrotum.

The scrotum is liable to chronic enlargement by hypertrophy; forming a large, simple tumor, within which the genital organs come to be altogether concealed; the prepuce alone remaining visible, at the lower part of the swelling, thickened, and warty; and from this point the urine is discharged in a scattered stream. The affection is much more frequent in hot climates than in this country. There is no cure, but by use of the knife. When the tumor is of no vast size, the incision may be planned so as to save the penis and testicles; and dissection is conducted cautiously with this view.[1] In the case of a large tumor, however, such an attempt may be hazardous; the patient being apt to undergo fatal exhaustion, under the tedious and painful operation, and the copious loss of blood. It is then better, probably, to sacrifice everything; and to effect removal, at once, by a few rapid strokes of a long bistoury. Before proceeding to any operation, however—and more especially to summary ablation—it is most necessary to ascertain whether or not scrotal hernia exist. If such be found, the incisions must be planned and conducted with peculiar care.

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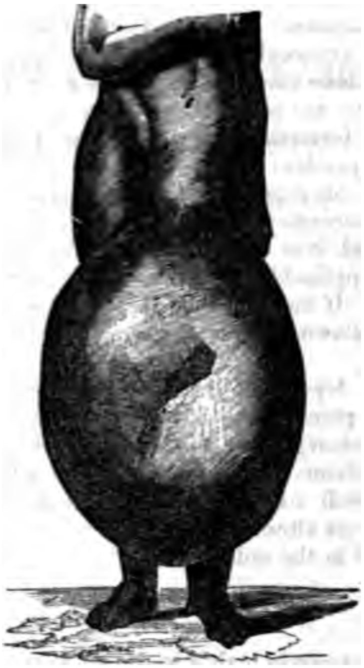
[1] Further details of this affection, and of the operative treatment required, with diagrams, will be found given by Dr. Brett, Lancet, No. 1174, p. 241.

Fig. 276.

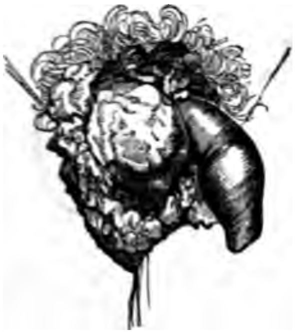


Hypertrophy, or elephantiasis of the scrotum, in a Hindoo.

Chimney-Sweepers' Cancer.

The integuments of the scrotum are liable to malignant ulceration; more frequently found in chimney-sweepers than in others—probably on account of the irritation of soot, and habits of uncleanliness; but not limited to that peculiar vocation. The ulcer begins in the form of a wart; and frequently is surrounded by warty formations. It may spread rapidly. Cure is by excision, or by thorough destruction by means of chloride of zinc paste; and certainty of success is to be hoped for only at an early stage—when the disease is as yet limited to the integument, and when no great amount of even this tissue is involved. At a more advanced period, when the testicle is exposed, and probably contaminated, a chance may yet be afforded by castration; provided the groins are free from secondary enlargement, and the constitution is not much broken down.

Fig. 277.



An aggravated example of chimney-sweepers' cancer; much superficial texture destroyed.

Priapism.

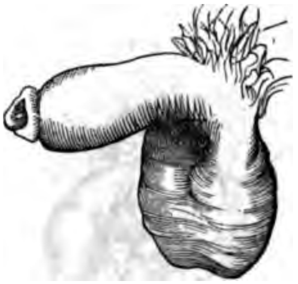
Permanent erection of the penis occurs in three forms. 1. From injury of the spine. This has been already noticed, as a distressing symptom of spinal fracture. 2. From vascular and nervous excitement, induced by excessive venereal stimulus. The turgescence may be such as temporarily to occlude the urethra, causing retention of urine; and this is to be treated by antiphlogistics and antispasmodics, as formerly noticed. 3. A more formidable variety may occur, from the same cause as the preceding; dependent on extravasation of blood into the corpora cavernosa—a vessel of some size having given way. In a case of urgency, it may be necessary to evacuate the extravasated blood by incision; but, in general, it is better to treat the case according to the general principles applicable to bruise; averting inflammation, and favoring absorption. If incision be made, there is great risk of troublesome suppuration following; incapacitating the organ afterwards for normal erection.

Sometimes chronic deposit, of a plastic kind, and probably of inflammatory origin, takes place in the corpus cavernosum; producing thickening, perhaps with enlargement of the part, and more or less obliteration of the erectile tissue. Erection, consequently, is imperfect and painful. Treatment will mainly consist of counter-irritation and sorbefacients to the part, with alteratives internally. Should stricture coexist, that must be removed in the ordinary way.[1]

Phimosis.

Phimosis and Paraphimosis both depend on preternatural contraction of the preputial orifice; the difference being, that in the one case the contracted portion occupies its normal position in front of the glans; in the other it is reflected behind the glans, and acts as a constriction there on the body of the penis.

Fig. 278.



Phimosis.

Phimosis may be congenital; an original malformation. In this case, if the contraction be great, the child is apt to suffer much. The urine escapes imperfectly; and, in consequence, chronic balanitis may ensue, or a calculous concretion may form. In after-life, the preputial contraction may have the same effect as a tight stricture of the urethra; causing first irritability of the genito-urinary system, afterwards organic change—stricture of the urethra, alteration in the coats of the bladder, dilatation of the ureters, and finally renal disease. Should these dangers pass by, and an advanced age be reached by the patient, ulceration is apt to take place at the contracted part; and, very frequently, the ulcer assumes ultimately a malignant action, and extends so as to involve the glans and body of the penis. It is important, therefore—on many accounts—to remove this source of evil as early as possible.

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[1] H. J. Johnson, Lancet, No. 1473, p. 481.

Acquired phimosis may be acute or chronic. The former is the result of an acute inflammatory process; following external injury; or sympathetic with gonorrhœa, balanitis, or venereal sores. The areolar tissue becomes infiltrated with serum; the swelling, thus caused, prevents the glans from being uncovered in the usual way; and discharge, accumulating, aggravates the disorder. The main treatment is by rest, fomentation, poultice, and general antiphlogistics. And, under this management, swelling may more or less rapidly disappear, and the normal state be regained. Failing this, and if there be urgency for the exposure of sores—which may be extending rapidly, and may require activity in direct applications—incision is necessary. It may be that the urgency is such as to demand incision very early in the case, while the sores are yet fully impregnated with virus; and then there is risk of the disease being much extended, by contamination of the recently made wound. Such risk may be in a great measure obviated, however; by applying an active escharotic immediately to the sore, so as to annihilate both the local poison and the poisoned part; and by touching the wound slightly with the nitrate of silver, so as to make a protecting crust on the raw surface. In general, the operation is to be delayed, until the sores are of such a date as to render impregnation of the wound at least improbable—the reparative stage having been reached, when discharge probably ceases to be virulent.

The chronic form of acquired phimosis may result from gradual increase of original malformation, or from cicatrization of ulcer, or wound. Like the congenital form, it is to be relieved only by operation. And this may be performed in various ways.

1. A simple and very suitable mode consists of inserting a director into the preputial cavity, retaining it by the side of the frænum, introducing on it a sharp-pointed curved bistoury, and by this transfixing and dividing the prepuce at its lower aspect. The director's point must in the first instance be moved about freely, to make sure that it is in the preputial cavity, and not in the urethra. The site of the incision is chosen for obvious reasons. If placed on the dorsum, two unseemly flaps are formed, and the glans is left permanently uncovered. By the side of the frænum, a less amount of wound suffices; the glans is equally well exposed; and, after cicatrization, no unseemliness results, nor is there any departure from the normal relative position of the parts. To prevent resilience of the integument from the mucous membrane, and thereby to prevent an unnecessary extent of raw surface, a fine suture on each side is required; and this is retained, until spontaneously freed by ulceration, or until consolidation has taken place by plastic exudation—whereby the natural resilience is obviated. 2. When the prepuce is redundant in front of the glans, the following operation is suitable:—The prepuce having been stretched, so as to clear the glans, the mere orifice is taken away, by the stroke of scissors or knife. Circumcision, in fact is performed; to a limited extent. The skin is found free enough, but the mucous membrane is still tight; and this is slit up, by scissors, at two or more points. The end of each flap of mucous membrane is

then secured, by a fine suture, to a corresponding portion of the integument. This mode of procedure is well suited to those cases, which are connected with a cluster of venereal sores on the very verge of the prepuce; both diseases being got rid of at once. It is also advisable when, in any case, the end of a long prepuce is much indurated, or otherwise permanently altered in structure.

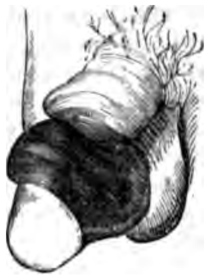
Paraphimosis.

A tight preputial orifice, reflected behind the glans, and permitted to remain there, constricts the body of the organ, and gives rise to very unpleasant consequences. The superficial areolar tissue swells greatly, on each aspect of the stricture; the glans swells too; and an acute inflammatory process is kindled, under unfavorable circumstances—the strangulated parts being obviously ill-provided with the power of resistance or control. There is the same necessity for relief, as in the case of strangulated hernia, so far as the preservation of structure is concerned; and relief is sought in the same way. Reduction generally is practicable, in recent cases. The patient's trunk having been steadied, and the parts well oiled, the surgeon grasps the glans with the fingers of the right hand, and makes steady pressure thereon, also pushing it steadily from him; at the same time with the fingers of the left hand, he draws forward the constricting orifice; the object being to push the glans, diminished by pressure, through the narrow preputial orifice. Anæsthesia is very necessary.

Failing in this, and there being no marked urgency, another mode of reduction may be attempted. The penis is placed erect, and on the glans a stream of cold water is maintained for some time. This may have the effect of so diminishing the bulk of the formerly turgid part, as to admit of its being placed without much difficulty within its preputial covering.

But should these attempts at simple reduction fail, or should the case be already so far advanced as not to warrant their being practised, incision is required. And little more than a scratch suffices, if rightly placed. The general bulge behind the glans is not to be widely laid open; but it is separated by means of the fingers, into its two component parts. In the depth between these the constriction is found, as a narrow band or thread; and that alone requires division. After reduction, the wound seems a mere notch in the preputial verge.

Fig. 279.



. Paraphimosis; the dark portion is the lining of the prepuce, reflected; the preputial orifice, the seat of stricture, is behind, between the two swellings.

If neglected, the glans may slough, or ulcerate destructively; or, the glans remaining merely congested, the stricture may cause ulceration of the body of the penis, opening the urethra, and producing urinary fistula. Operating lately on a case of this kind, in a boy, after the paraphimosis had existed unreduced for three months, I divided a piece of thread which encircled the penis—deeply imbedded in it—and which had been secretly applied as a jugum, to prevent punishment on account of enuresis.

When paraphimosis and venereal ulcer of the glans coexist, there is an especial necessity for immediate relief; otherwise, acute phagedæna, or sloughing, cannot fail to supervene. It may happen that the constriction has been slight, and of old standing; and that, in consequence, even after extensive incision on the dorsum of the penis, reduction is found impracticable; the parts being firmly glued to their abnormal site by plastic exudation. Under these circumstances, we must be contented with simple relief of the stricture, by suitable incision; leaving restoration of normal relative position to be effected when resolution of the inflammatory process has become complete.

Hypospadias.

This term denotes an imperfect condition of the urethra, at or near its orifice; the result sometimes of accident or disease, but usually a congenital malformation. There may be a vestige of the normal opening at the apex of the glans, the urethra terminating somewhere behind this; or, as more frequently happens, the anterior portion of the canal—to the extent of an inch or more—appears as if slit up, the margins of the wound having become rounded off; in other words, the lower part of the wall of the canal is deficient. In extreme cases, the whole antepubal part of the urethra may be thus imperfect. The inconveniences of the affection are, a scattered and ill-projected stream of urine, perhaps inefficient emission of the seminal fluid, and a raw, congested state of the exposed mucous membrane. When there is rather a slitting up, than a deficiency of parts, the edges may be pared and brought together over a catheter. When the parts are actually deficient, autoplasty must be had recourse to; a portion of integument being borrowed from the neighboring perineum or scrotum, and engrafted into the hiatus. In the minor cases, however, which constitute a decided majority, no interference is necessary; the inconveniences, if any, being slight.

Hyperspadias, or Epispadias.

This is an analogous, but opposite state; the splitting up—or rather the non-development—having taken place on the dorsal aspect. The chasm may extend from the glans to the symphysis pubis. In general, there is a sufficiency of parts to admit of paring the edges, and approximating them by suture over a catheter. Immediate union is not likely to occur at every part; but permanent closure may ultimately be obtained, either by repetition of the operation at the unclosed points, or by occasional application of the heated wire.

Imperforate Urethra.

A congenital malformation, in this respect, is obviously to be remedied in but one way; by the plunge of a round trocar and canula, in the proper direction; and by keeping the artificially constructed canal pervious, by the lodgment of a catheter—changed occasionally to prevent calculous deposit.

Malignant Disease of the Penis.

This is found only in the aged; and frequently, as already stated, it may be traced to the irritation of congenital phimosis; beginning in the preputial orifice, by ulceration, and extending thence to the body of the organ—or, it may be, beginning in the glans itself. The glans is enlarged and indurated; angry ulcers penetrate it in various places; the body of the penis suffers likewise; the lymphatics on the dorsum swell and harden; the glands of the groin are involved; retention of urine may ensue, by pressure of the secondary tumors on the neck of the bladder; the cachexy advances; and the patient perishes—his end perhaps hastened by hemorrhage from the open and deep cancer.

Nothing but the knife can afford a chance of cure. When the prepuce alone is affected, its removal is sufficient. Sometimes a malignant ulcer attacks the integument of the body of the penis, originating there; it may be long and successfully resisted in its advance, by the dense fibrous fascia which invests the organ subintegumentally; and in such a case, removal of the affected surface by dissection may suffice. When the glans and body are involved, nothing short of amputation of the entire thickness affords a prospect of cure—cutting in sound parts, between the disease and the symphysis pubis; and the attempt is warrantable, only when as yet the lymphatics show no sign of implication. When the glands are already enlarged, there is nothing left in our power but palliation; and, as formerly stated, puncture of the bladder above the pubes may be required, towards the close of the case, on account of retention of urine.

I lately met with an affection which strongly simulated malignancy. In a gentleman of middle age one half of the lining membrane of the prepuce was occupied by a flat growth; partly warty and hard, partly smooth and villous, in every part highly vascular. This was the seat of intense irritation; the least touch was agony; frequently pain shot violently down the thigh; sleep was denied at night; the general health was wasted; and the patient professed himself, as he seemed, most miserable. The corresponding part of the glans was red and excoriated. The disease was removed freely by the knife; and perfect cure resulted.

Amputation of the Penis.

This is had recourse to on account of malignant disease, affecting the body of the organ; but only when there is a sufficient space of sound texture between the disease and the pubes, and when the glands yet show no sign of contamination. The ordinary mode of performance is exceedingly simple. The organ, stretched by the left hand pulling it outwards, is lopped off by one sweep of an ordinary amputating knife—laid upon the part, and moved rapidly across from point to heel or conversely. The integument is encouraged to contract towards the pubes; so that, during the puckering of cicatrization, it may not overlap and interfere with the orifice of the urethra. And this is kept of the normal calibre, by a suitable use of bougies.

Ricord's method of operating is preferable, however, being well calculated to obviate the principal difficulty—namely, tendency to contraction in the orifice of the urethra. Rapid healing of the wound is also promoted; and, at the same time, a sufficient covering is provided for the corpora cavernosa. The procedure is conducted thus: After amputation in the ordinary way—enough skin being left to cover the corpora cavernosa, and no more—the surgeon seizes with forceps the mucous membrane of the urethra, and with a pair of scissors makes four slight incisions, so as to form four equal flaps; then, using a fine needle, which carries a silk ligature, he unites each flap of membrane to the skin by a suture. The wound heals by the first intention; adhesions form between the skin and mucous membrane; and these textures become continuous—a condition analogous to what is observed at the other natural outlets of the body. The cicatrix then contracting—instead of operating prejudicially, as in the old method—tends to open the urethra, by pulling its lining membrane outwards.

When, in the case of a short stump, inconvenience results from inability to direct the stream of urine in a sufficiently outward jet, the deficiency of the organ may be temporarily compensated, when the patient makes water, by a mechanical adaptation—a funnel-shaped canula, of sufficient length, its base resting on the pubes.

Travers on Phimosis and Paraphimosis, Lond. 1818. Earle and Travers on Chimney-Sweeper's Cancer, Med. Chir. Trans. vol. xii. Larrey, Mém. de la Chir. Militaire, tom. ii, p. 110. Titley, Med. Chir. Trans. vol. vi, p. 71. Liston, Edin. Med. and Surg. Journal, vol. xix, p. 566, 1823. Key, Case of Hoo Loo, Med. Gazette, vol. viii, p. 93, 1831. Bergson, Die Beschneidung vom Historischen, &c., Berlin, 1844.

CHAPTER XXXVII.

AFFECTIONS OF THE FEMALE GENITAL ORGANS.

The affections included in this chapter are considered very briefly, the great majority belonging to the exclusive province of the obstetric practitioner.

Inflammation of the Vulva

Occurs at all ages. In the adult it presents no marked peculiarity in its history or treatment.

In the child it forms the disease generally called infantile gonorrhœa, or infantile leucorrhœa. This affection, which was long mistaken for the result of attempted impure connection, may occur at any period of adolescence. It is most frequently seen in delicate, unhealthy children; and more among the children of the lower than of the higher classes. Not unfrequently it comes on during convalescence from the eruptive fevers, or during teething.

Sometimes no cause can be assigned; or it may be induced by worms or other rectal irritation, by want of cleanliness, or by exposure of the parts to damp and cold.

The symptoms are, constant irritation and pain, so that the child is frequently moving its hand towards the part; pain and scalding in making water, to which the calls are sometimes inordinately frequent; and, in addition, the ordinary signs of slight febrile excitement.

On inspecting the pudenda, they are found bathed in pus; the whole surface of the vulva is swollen, red, and tender; and there is frequently, on and around the vulva, an eruption of a few red and inflamed spots, which may either disappear, or go on to form small pustules.

Treatment is simple. In mild cases, nothing but cleanliness may be required. In the more severe, it is necessary to exhibit laxative and alterative medicine, to keep the patient in bed, to allay feverish irritation by hot bathing, to apply locally hot fomentations at the outset, and subsequently to use various washes—as a weak solution of nitrate of silver, or of sulphate of zinc. The decoction of poppies is often useful to remove irritation. If the skin is broken, care must be taken, during the healing, to prevent cohesion of the labia.

Sometimes the disease affects children along with a low form of fever; and the inflammation may go on to sloughing. The vulva is also sometimes, in adults, the seat of extensive and unhealthy ulceration, and of *noma*, with accompanying fever of a low typhoid character.

Abscess of the Vulva

May be the result of mechanical violence, or the secondary consequence of sanguineous extravasation into the subcutaneous or submucous areolar tissue. It may follow erysipelas, or acute phlegmonous inflammation of the glandules of the areolar tissue of the part, arising without assignable cause. Occasionally there is a succession of such abscesses in the vulva: apparently induced by inflammation or irritation of the vagina, or of the deeper-seated organs. It is a common affection of prostitutes; and in them frequently ends by forming fistulæ. When the disease is a consequence of sanguineous extravasation, it also sometimes ends in fistula; the purulent deposit extending, like the sanguineous, from the vulva upwards along the walls of the vagina—or in other directions, as towards the anus.

The origin and progress of abscess in this situation does not materially differ in any respect from its history as originating elsewhere. Generally, the accompanying pain is severe; but if the abscess has followed extravasation of blood, the pain and constitutional symptoms may be comparatively slight.

The affection is distinguished from thrombus by the presence of more or less fever, by the acuteness of the pain and tenderness, by gradual progress of the swelling, and by the color of the integument over it; from varicose veins of the vulva, by its sensibility on pressure, by its tension, and by not disappearing when the patient lies down; from hernia, by the absence of impulse on coughing, its history, progress, &c. There is no special point to be attended to in the treatment. The abscess should be opened early; and, in preference, from the skin, not from the mucous membrane. Every attention must be paid to the encouragement of speedy healing, in order to avert the danger of the formation of fistula. If, in spite of all care, a *fistula vaginæ* does form, and proves tedious, it must be dealt with by free incision.

Thrombus of the Vulva

May be in either labium, or in both. It is most frequently caused by the efforts of parturition; but may also follow external violence, efforts at stool, &c. Persons affected with varicocele of the labia are predisposed to the affection. The thrombus may attain to very large size, so as, in the case of parturition, to prove an obstruction. In such circumstances, the treatment consists in making a free incision, evacuating the blood and coagula, and restraining hemorrhage by pressure; with or without stuffing of the wound. In the case of accidental wound, risk by hemorrhage is great.

If the tumor is small, it may cause no uneasiness; and requires no treatment, except the use of cooling and discutient lotions, with rest.

Warty Excrescences of the Vulva

May be situated on the labia, nymphæ, or vestibulum; or all these parts may at the same time be affected. The growths may be of considerable size; and when numerous they distend the vulva. They may be of syphilitic origin, or may arise from other causes. They are the source of much pain, irritation, and annoyance; and may produce a quantity of muco-purulent discharge, especially if seated on the mucous membrane. If small and recent, the application of nitrate of silver may disperse them; or they may be powdered with calomel and chalk. The larger may be removed by strong caustics, as potass, or the acids; but in most cases it is better to cut them off by scissors—subsequent hemorrhage being checked by cold and styptics. The bulky growths, as already stated, may require a regular dissection for their removal.

Occasionally the whole labia and nymphæ become so hypertrophied, in connection with venereal disease, as to require excision. In such cases, they generally have the most irregular form, sometimes presenting large or small openings or windows without ulceration.

Oozing Tumor of the Labium

Is a rare disease. One or both labia may be affected. The part—hard, sulcated, and discharging a watery acrid fluid—is the seat of much pain and itching; and the neighboring parts are irritated. Local treatment by caustics, iodine, astringent lotions, &c., combined with use of laxative and alterative medicine, may be effectual in curing the complaint; if not, the affected textures must be removed by the knife. But after all this, the disease is apt to recur.

Pruritus of the Vulva

Is a frequent accompaniment of pregnancy, and of disease in the rectum or vagina—especially leucorrhœa. It is more common in advanced life than in youth; and is a cause of very great suffering. To some women it renders life absolutely miserable. The skin of the parts is generally dry, and often has a rough and cracked appearance; sometimes it is indurated, and more than usually callous in ordinary sensation. Not unfrequently there is a rush of small, inflamed, and excessively irritable papulæ over the affected parts; or there may be spots of chronic eczema, especially on the labia, or aphthous incrustation of the nymphæ and vestibule.

If there is any marked exciting cause, its removal will do much towards effecting a cure; and permanence of the relief may be established. But under other circumstances, the disease generally proves very intractable, especially in those of advanced years.

If the patient labors under irritable bowels from any cause, that must be remedied; if worms are present, they must be expelled; if there are piles, they must be cut or tied; if leucorrhœa exist, its cause is to be inquired into and removed; if there are pediculi, they must be destroyed and cleanliness enjoined. In general, some laxative and alterative medicine is beneficial.

Numerous local applications are of service. Among these are—camphor and chalk powder in equal parts; or calomel, to dust on the part. Simple iced water; or very warm water; or infusion of tobacco, with borax or carbonate of soda added; or Goulard's lotion; or decoction of poppies, with sugar of lead; or a weak solution of nitrate of silver; or camphor mixture, with carbonate of soda; or diluted hydrocyanic acid; or solution of borax with sulphate of morphia—as lotions. Among ointments, the diluted citrine, the mercurial, the hydrocyanic, the sugar of lead, are recommended; as also borax and honey.

Malignant Ulcer of the External Parts

Occasionally shows itself. It is recognized by the ordinary characters of malignant ulceration, and demands the ordinary treatment. Early and wide removal is the only remedy.

Sometimes the labia are found enlarged, and more or less extensively and deeply ulcerated; forming a disease which, from its intractability, may well be called malignant; although it has no other character of a cancerous sore. Strong caustics may succeed in producing healing action; but if not, the knife must be resorted to.

Tumors of the Labia.

In the Labium, fatty tumors are the most common; easily removable by the knife. Simple enlargement sometimes takes place in one labium, or in both; constituting a tumor analogous to the Elephantiasis Scroti of the male.

Encysted tumors occasionally form; when of small size, removable by incision, and evulsion of the cyst; when large to be dealt with by regular dissection. Hernial tumors, be it remembered, are also met with in the labium; recognizable by the ordinary signs, and amenable to the ordinary treatment. Varicocele is also common in this situation.

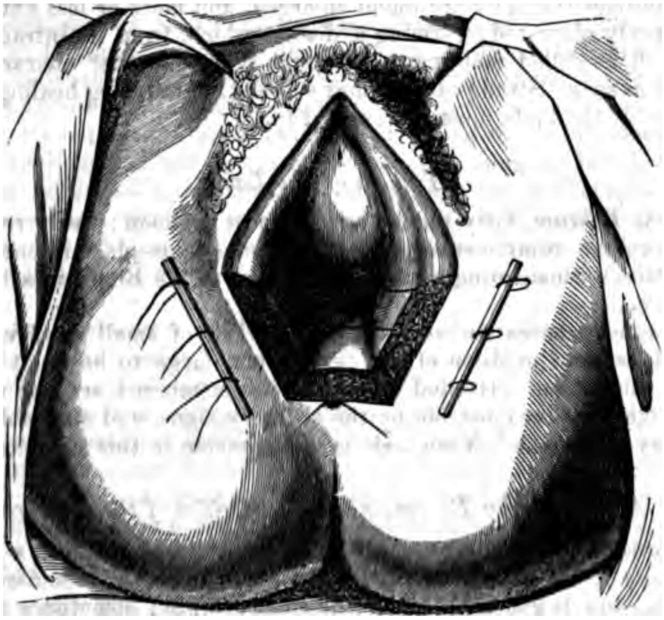
A Red Fleshy Excrescence in the Orifice of the Urethra

Is productive of intense suffering, on account of the part's extreme sensibility to the urine, and to all external influences. It is easily made to bleed, and is generally about the size of a pea; sometimes as large as a small hazel-nut; usually at the verge of the canal, partially projecting, but sometimes also prolonged upwards into the urethra; and sometimes it forms a complete circle surrounding it. The only remedy is by excision; or by simple ablation, followed by the use of an escharotic to repress growth. During healing of the wound, the nitrate of silver is of much use in restraining inordinate sensibility; applied lightly, every alternate day. But the growth is apt to reappear; again demanding treatment.

Laceration of the Perineum.

This is a casualty of parturition; the parts tearing down towards the anus—perhaps with implication of the bowel. The wound is kept clean, and approximation is effected and maintained by adduction of the thighs. Suture in the recent state of the injury is quite improper; and should in fact be long delayed, as nature generally makes sufficient reparation of the injury. If necessary, the unclosed portion, having had its edges made raw by the bistoury, is brought together by means of the quilled suture, applied according to the ordinary rules—the form of suture found most suitable in almost all cases of solution of continuity in these parts. If after (or before) using the sutures, it be evident that the pared edges do not come easily together, then incisions through skin and superficial fascia may be made parallel to the margins of the fissure, and at a distance from it of about an inch, as recommended by Dieffenbach. Latterly it has been suggested by Dr. B. Brown as more advisable, to divide the sphincter ani on both sides, just before inserting the sutures. By this plan muscular traction upon the united edges is annulled. After the operation the rectum should be kept at rest for several days. The urine should also be frequently drawn off in a very careful manner to prevent any trickling over the pared edges. The sutures should be removed on the fourth or fifth day.

Fig. 280.



[Baker Brown's operation, showing the denuded surfaces; and the insertion of the quill sutures, before the parts are brought together; also, the division of the sphincter on each side of the coccyx.—Am. Ed. Surg. Dis. of Women, p. 40.]

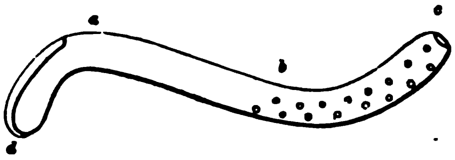
Vaginal Fistula.

Of this there are many varieties: Vesico-vaginal, Urethro-vaginal, and Recto-vaginal, being the most common and important; all the result, usually, of accident in parturition. By an unskilful use of instruments, the parts are torn; or, they are subjected to prolonged and severe pressure by the child's head, and sloughing consequently ensues.

Vesico-Vaginal Fistula denotes an abnormal communication between the vagina and bladder. During parturition the parts suffer irrecoverable injury. Two or three days afterwards a slough may separate; if the urine have not been previously discharged, a gush follows; and afterwards, a draining away of that fluid remains; or, if there has been a laceration, there may be a discharge of urine, per vaginam, from the first. The patient is in constant discomfort and suffering. In spite of every attention, congestion and excoriation of the external parts ensue; and if constant diligence is not applied to maintain cleanliness both of person and dress, the patient's proximity may be noisome to others. As the chasm closes, the discharge diminishes. In some rare cases, spontaneous closure may be complete. In the great majority, an aperture remains; sometimes such as will barely admit a common director; sometimes a loathsome chasm, admitting several fingers. The aperture usually is in the mesial aspect behind the origin of the urethra. It can be felt by the finger; and may be disclosed by the bivalve speculum; or flat copper spatulæ may be used to hold aside the walls of the vagina. In consequence of this canal having suffered other injuries; it may become distorted and irregular; and the discovery of the fistula, if small, may in consequence be very difficult. Detection is effected by placing a metallic catheter in the bladder, and examining the septum upon the catheter by a finger introduced per vaginam; or a probe may be passed from the vagina through any sinus, till it come in contact with the catheter.

Treatment, palliative or radical, should be commenced as soon as possible after the discovery of the disease. The former consists in taking measures calculated to prevent the constant and involuntary discharge of urine; the latter implies an attempt to close the abnormal aperture of communication. It is quite possible to dilate the vagina, the patient being on her back in the position for lithotomy, or on her elbows and knees; to expose the injured parts; to pare the edges of the opening by a bistoury, *in situ*, or after bringing them down by manipulating with a large bougie introduced per urethram; to make, if necessary, accessory incisions, after Diffenbach's method and as practised by Jobert, such as will allow coaptation of the edges of the fistula without tension of the ligatures; to affect approximation by quilled sutures, by means of such instruments as are employed in staphyloraphé; to insure constipation of the bowels for several days after the operation, and to leave a catheter in the urethra, so as to conduct off the urine as it enters the bladder. A peculiar S shaped catheter is used, which retains its place in the bladder without straps or ligatures.

Fig. 281.

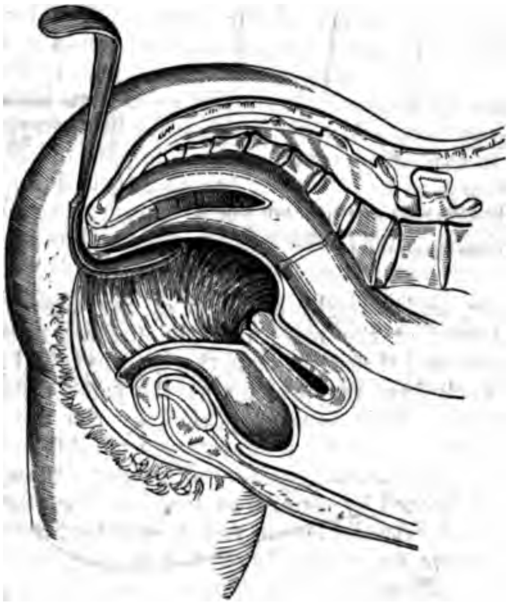


[Self-retaining catheter of Sims. *a* to *b*, urethral portion; *c*, vesical extremity, behind symphysis pubis. *d*, outer end, which hangs down at the meatus.]

Sometimes, however, the catheter cannot be tolerated; and then the prospect is less hopeful. All this can be done, with difficulty to the operator, and pain to the patient; but a successful issue is improbable. The ligatures may remain even for two or three weeks, and all the urine be naturally discharged for that time, without adhesion of the edges of the wound having been effected. And so discouraging has been the result of such attempts hitherto, that many surgeons are agreed in the propriety of treating most cases of severe Vesico-vaginal Fistula by palliative means alone. [The results of the operation as practised in the United States by Hayward, Mettaüer, and, more recently and especially, by Sims and by Bozeman, are much less discouraging. The admirable methods of the last-named operators have been for some time established, as far in advance of all others, and hence deserve in an American edition a more detailed account than appears in the author's text. That of Dr. Sims is sufficiently described in the abstract prepared by Dr. Sargent for the third American edition of this work, which is here retained.

" Instead of placing the patient upon her back, as is recommended by most operators, Dr. Sims places her upon her knees, the nates being elevated, and the head and shoulders depressed; the vagina is then opened, and the recto-vaginal septum elevated by means of a peculiar '*lever speculum*' held by an assistant. Sometimes, where a particularly strong light is required, the sunlight is made to fall upon a small mirror, so placed as to throw a bright reflection upon the part to be examined.

Fig. 282.



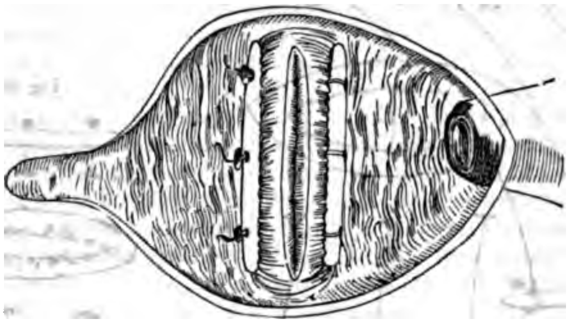
[Patient in position, with the Lever-speculum introduced.]

" The margin of the fistula is pared, as in other operations, the instrument used being, however, somewhat peculiar.

bars are approximated as closely as is deemed advisable—not too closely, lest strangulation be induced—and the ends of the wire are secured as in the first case, and cut off.

"On the third or fourth day after the operation, an examination is made to ascertain the condition of the parts, and again on the sixth or seventh day; if the sutures are not producing any unpleasant effects, they are allowed to remain until the ninth or tenth day.

Fig. 285.



[Appearance of the parts with the suture applied.—SIMS.]

"In order to prevent any injurious action of the urine upon the wound, Dr. Sims retains in the bladder a silver catheter of a peculiar form [Fig. 281], so shaped, indeed, that it maintains itself in the bladder, without any retentive means being necessary.

"The recumbent posture is to be strictly maintained, and the catheter is to be worn for at least fifteen days, when Dr. Sims usually finds that the orifice has become pretty firmly closed. The bowels are not permitted to be moved, and, to secure their quiescence, opium is used as freely as may be necessary."

Dr. Bozeman, in an able and instructive paper (Louisville Review, May, 1856, p. 86) objects to the clamp suture, as liable to ulcerate, difficult to apply properly without much especial experience, frequently unavailable in double fistulas, on account of the impossibility of closing both openings at once, and lastly, as incapable of being made to act only in one direction, and hence not easily managed so as not to press unevenly. These, and other minor difficulties experienced by Dr. Bozeman, led him to resort to a new contrivance, which he calls the "button suture," and which is, as he remarks, only a modification of the twisted, as the clamp is of the quill suture. The essential parts of the apparatus consist of wire for the sutures, a metallic button or plate, and perforated shot to retain the latter in place. The wire should be of pure silver, about the size usually marked No. 93, and properly annealed. A length of eighteen inches should be allowed for each suture. The button may be made of lead, hammered to the thickness of one-sixteenth of an inch, or, what is much better on every account except the cost, of silver. The object of the button being to cover the fistulous opening after the introduction of the sutures, its size and peripheral outlines must vary according to the necessities of each case, although the circumference is most frequently oval or elliptical. It is important, however, that the under surface should l slightly concave, or cupped, with the edges turned up like a cymbal, (the shallow, old-fashioned French barber's basin. Along the middle the button runs a line of perforations, large enough to give passage easi to two thicknesses of the wire. These holes are about three-sixteenths an inch apart, and vary in number, of course, according to the exte and requirements of the fistula, and the size of the button. The wir having been introduced, their opposite ends are drawn together by mea of a convenient instrument, so as carefully to approximate the freshen edges of the fistula. A suitable button is then placed or strung up the straightened wires, with its concave surface looking towards t vaginal septum, and is gently pushed down until it is closely and firm fixed against the mucous surface around the margin of the approximat edges of the wound. These edges are thus sheltered from all irritati while they are held together by the compression of the everted portion the button, which acts like the quill, but more efficiently, and by t sutures fastened through the central holes directly over the line union, which force them together like ordinary sutures, without the in rious constriction created by a common suture knot. The operation completed by clinching each wire with the customary shot, and cutti off the ends close to the shot on the outer surface of the button. T various steps of the operation are facilitated by ingenious yet very simp instruments, for detailed description of which, together with full dir tions, we must refer to the original paper, and to a later article by t same author, in the North American Medico-Chirurgical Review, Jul 1857.]

The minor cases are remediable by simpler procedure; the oc sional use of heated iron. The part is exposed by means of curv wooden spatulæ, or by an ivory speculum with an aperture in its sid The iron, at a white heat, is accurately applied to the aperture; and, long intervals, the application is repeated. The judicious operator, wl wisely seeks only the remote, cicatrizing, and puckering effect of tl burn, will seldom, if ever, make the interval shorter than three week and often a much longer period may be found advisable. At the sa time, all avoidable exertion is abstained from, the recumbent posture maintained as much as possible, the vagina is temporarily occupied by sponge or other plug, cleanliness is much attended to, and the marit use of the parts must, of course, be utterly abstained from. Mere fistul are quite curable in this way. And in the case of any opening, not larger size than what is barely sufficient to admit the end of the litt finger, cure may be thus attempted. In small fistulæ, the application lunar caustic every three or four days is occasionally effectual.

Palliative treatment consists in the use of the adjuvant means ju mentioned; occupying the vagina by a restraining plug; attending cleanliness; preventing filth, fœtor, and excoriation. Probably the be means of occupying the vagina is by a piece of sponge, repeatedly change or by a pyriform caoutchouc-bottle, of moderate size, enveloped in a pie of oiled silk, introduced in a state of collapse, and then inflated by mea of a nozzle and stopcock, or by means of such a valve as is used in ai tight cushions. Thus accurate compression is made on the aperture, as to prevent escape of urine; and both comfort and cleanliness are obtained. The bottle is withdrawn daily, the air being previously permitted to escape; at the same time the vagina may be cleared of accumulated secretions by means of a syringe, and fœtor may be removed by solution of the chlorides. The bottle, having been cleaned, is replaced.

Immediately after the occurrence of the accident, something may be done to favor spontaneous contraction of the aperture, and perhaps spontaneous cure. The patient is directed to lie as much as possible on her face; a catheter is constantly retained—being removed only for the purpose of being cleaned; a sponge, or some dressing, which must be changed with great gentleness, is placed in the vagina, of sufficient size to exert a moderate closing pressure on the injured part—so as to prevent cohesion of the wound to the walls of the vagina, with consequent complication of the case. Unfortunately, however, the catheter cannot, in all cases, be tolerated, and consequently the benefit of this plan of treatment is lost. The bowels are either to be prevented moving altogether, or kept gently open, so as to preclude the necessity of straining.

Urethro-Vaginal Fistula denotes a preternatural communication between the vagina and the urethra; caused, ordinarily, by the imprudent use of instruments. In general, the same disagreeable results occur as in the former case. Sometimes there is power of retention; but, in evacuating the urine, it trickles through the vagina and over the limbs. The treatment is the same, but more frequently successful.

Recto-vaginal Fistula.—Laceration of the septum between the vagina and the bowel takes place, from the rash use of instruments, or by tearing in the natural efforts of parturition, or as a consequence of sloughing from pressure. In the latter case, the perineum usually suffers laceration also. The parts are to be kept clean and quiet; and spontaneous diminution of the chasm is favored by every possible means. When the fistulous condition has been arrived at—that is, when the margins of the tear have healed, and contraction has ceased—the parts are exposed, by means of a speculum, if necessary; the edges are made raw by paring, and approximation is effected by means of the quilled suture. The parts, in this case, being comparatively superficial, the operation is performed not only with comparative ease, but also with a good prospect of success. If the aperture is small, it may be treated by caustic or cautery, like the vesico-vaginal fistula.

In the advanced stages of cancer of the female organs, these fistulæ frequently are produced by malignant ulceration of the septa. Of course, in such cases, no surgical treatment is admissible.

Stricture of the Vagina.

This may be the result of previous inflammation, indurating the mucous and submucous tissues of a part of the vagina; or it may follow on the healing of a wound received during artificial delivery, or otherwise; or it may be consequent on ulceration, either of a specific character, or produced by a badly arranged pessary. Finally, it may be the result of cancerous deposit. Under ordinary circumstances, it is amenable to the same treatment, by gradual dilatation, as contractions of other the surgeon is at the left side of his patient, the fore-finger of the left hand, if on the right side the fore-finger of the right hand, is passed under the flexed thigh, to the upper part of the orifice of the vagina, which is distinguished from the vestibulum by its rugosity; the catheter is so held in the other hand, passed over the thigh that its length is directed towards the vulva; its point is made to touch a little above the fore-finger placed as directed—and, by moving the point downwards, in the mesial line, it slips into the orifice of the urethra. Or, the finger is moved in search of the urethral orifice; which is recognized by feeling just above the vaginal orifice a depression, sometimes with a slight surrounding elevation; and, along the finger, the catheter is then directly introduced. When there is displacement of the parts, a common elastic catheter may be found more suitable than the silver instrument; as then there may be both twisting and elongation of the canal. The ordinary silver catheter should be flat, very slightly curved, about six inches in length, and having some projection or knob near its outer orifice, to prevent its slipping into the canal altogether.

Plugging of the Vagina

Is a most useful and important operation, as a hemostatic, when flooding (not *post partum*) has to be arrested. In every form of hemorrhage from the vagina, it may be of the greatest service; and often is in fact the means of saving life. The simplest and most convenient method of plugging is to use pieces of sponge, or lint, or linen; placing them in the vagina one after the other, every piece being lodged as high as possible. When the bleeding is passive, not many pieces may be required; but if vessels have been opened by operation, the plugging must be done very efficiently; the vagina being well crammed, and a T bandage applied to support the pledgets, which may be previously saturated with vinegar, or solution of matico, or other astringent and styptic lotion. Great care must be paid to watch against return or persistence of the discharge; and the plug should be carefully removed at the end of about twelve hours; to be replaced, if necessary, with new materials.

Another plan, not so easy of execution, is to pass the centre of a napkin into the vagina; thus making a blind pouch there open from without, and into which the necessary amount of stuffing may be passed. Or, a bladder may be passed and inflated with air, or filled with refrigerant solutions. Or the same may be done with bags of vulcanized caoutchouc; and some ingenious instruments have been constructed for the purpose.

Leucorrhœa

Is a nosological term, used to indicate a state of disease having discharge of a mucous or muco-purulent character from the vagina as its most prominent phenomenon. Apart from its occurrence as a symptom of almost all the more serious uterine affections, it is the most common of female diseases; and occurs in a great variety of forms.

The *discharge commonly called* " *Whites*," may exist without any defined disease in the vagina or uterus, and may be the result of general debility and relaxation of system, especially if in a scrofulous constitution; or it may occur during amenorrhœa. Occasionally it supervenes after the manner of a common catarrh. Often, also, it is a persistent excess of secretion *post partum*.

In such a case, if examination be made by the speculum, no organic lesion may be discovered. Sometimes, however, the mucous membrane of the cervix uteri is found red and injected, or slightly abraded—and a long tag of clear viscid mucus generally hangs from the os. The surface of the vagina is covered by a dense white mucus.

In this, as well as in all other forms of leucorrhœa, the symptoms complained of by the patient may be either few or numerous. They are a class of symptoms common to all uterine affections, viz.: disorders of the menstrual function; pain in the back and loins, in the hypochondria, across the hypogastrium, and down the limbs; feelings of bearing down and unnatural weight in the perineum; besides the ordinary accompaniments of disordered stomach and bowels. In most such cases, no local treatment is required. On the contrary, by causing excitement and irritation, it would probably aggravate the complaint. Cold sponging, or the cold hipbath, with attention to the general health, will suffice. The tincture of cantharides, and the various preparations of iron taken internally, often seem to have a good effect in diminishing the discharge.

If the case be one of *vaginitis, simple or specific*, there will, in addition to the other symptoms already mentioned, be those of febrile accession, along with much local pain, irritation of bladder, ardor urinæ, pain in defecation, and in walking. The discharge will not be white and mucous, but muco-purulent. In such circumstances, vaginal examination will reveal a preternaturally red color, and generally a granulated appearance of the mucous membrane, with much tenderness. Treatment consists in maintaining the horizontal position, fomenting or poulticing the parts externally, and internally using a bland or sedative injection; besides employing purgatives and all the ordinary treatment of gonorrhœa. Especial care must be taken against the disease assuming a chronic form.

The most frequent cause of these leucorrhœal complaints, when they come to demand local treatment, is an *inflamed and ulcerated, or otherwise morbid state of the cervix uteri.* The disease may occur in an acute form, but is more frequently met with as a chronic complaint. The symptoms are severer than in the case of "whites," and the general health at length suffers severely. The discharge may vary much in quantity, it may also be of various consistence, it may be muco-purulent or almost pure pus, and it may, or may not be tinged with blood. If of long continuance and profuse, it often causes much irritation of the labia externally. Sometimes it is complicated with displacement of the womb, or with chronic inflammation, or engorgement and hypertrophy, of the whole organ; and these circumstances much retard the progress of cure. All women are liable to such complaints; but the married and child-bearing suffer both most frequently and most severely.

In this brief sketch it is expedient to treat of the numerous morbid, non-malignant states of the cervix together; more especially when we consider that they cannot in any way be distinguished from each other, without a tactile and visual examination of the implicated parts; and further, that the treatment, in its general features, is similar in all. Passing over, with simple mention, the aphthous, herpetic, and other forms of integumental disease, rarely if ever observed, we notice *the simply inflamed and ulcerated cervix.* All the signs of inflammation are present; but the pain and tenderness may not be very severe. The part may be more or less indurated, and the degree of swelling varies. Sometimes the cervix acquires considerable bulk, is hard and somewhat nodulated, the nodulation in this case being in the form of masses arranged pucker-like around the os. There may then be some difficulty in diagnosis from cancer; the more especially as the weak, pallid, and cachectic appearance of the patient often appears to favor the notion of malignancy. It happens very rarely, however, that carcinoma of the uterine neck is actually mistaken for hypertrophy; for the former is generally found, even on a first examination, to be in an advanced state. At the same time, it is to be remembered that chronic inflammation with hypertrophy is not unfrequently mistaken for carcinoma; and sometimes even the most experienced find a difficulty in diagnosis, till the result of treatment has been ascertained. The following points are distinctive in most cases. In carcinoma there is the peculiar cachexy of system; and the morbid deposit may extend from the cervix more or less over the roof of the vagina, rendering the uterus fixed in the pelvis. There is generally intense induration; irregular nodulation; and if there be ulceration, the indurated points projecting into it are friable under the finger; the ulceration is deep and irregular in form; and the discharge is frequently fetid, watery, grumous, and sometimes mixed with blood.

In inflammation of the cervix, the accompanying ulceration most frequently attacks the posterior lip. The ulceration may be of various kinds; simple or healthy, indolent, irritable, or weak.

The cervix uteri is also liable to *a granular form of inflammation.* The part is tender, red, and having the mucous membrane abraded or superficially ulcerated over a great part or the whole of its surface; and bears numerous red points. These are the larger papillæ engorged and projecting, from being denuded of the thick epithelial layer in which they are naturally buried. Generally, it is also somewhat enlarged; and frequently, in this case, the vagina is irritated, or more or less inflamed, around the cervix.

When the ulceration is healthy, and there exists no complication, it is easy to effect a cure, by enjoining rest of the parts, and using any simple detergent or mild astringent lotion. If it has been protracted in duration, or is unhealthy in its character, the lunar caustic may be used through the speculum, every third or fourth day; care being taken to secure its proper application, by cleansing the parts with a small sponge or dossil of lint, previously. In all forms of inflammation of the cervix with ulceration, this is one of our most useful resources; and in most cases, along with proper regulations as to rest of the parts, and attention to the general health, it is successful. If the ulceration prove obstinate, however, other means may be tried; as the local application of sulphate of copper, nitric acid, the acid nitrate of mercury, chloride of zinc, caustic potass, or potassa cum calce, or even the cautery, all with pens spontaneously at this time. Into these details this is not the place to enter. It is sufficient to state that if the organ be not reduced very soon after the displacement has occurred, it will speedily become irreducible. If death do not quickly follow, the case becomes one of chronic inversion, which, inducing as it does large losses of blood, exhausting discharge, with rectal and vesical irritation, is the cause of constitutional disorder so serious as to suggest the propriety of completely removing the inverted organ. The statistics of the operation are not sufficient to found a decided opinion upon; but they are encouraging, when we consider the gravity of the complaint. The surgeon has to decide whether his patient's best chance lies in tolerating the disease and combating its effects, or in submitting to the risk of operation. On the one side, there is a grave disorder which frequently proves fatal, by exhausting the patient—if not more directly; and on the other we have the favorable experience of numerous surgeons who have practised extirpation of the organ.

It is sometimes difficult to diagnose this affection from polypus; but in general it can be made out with great certainty. In inversion, we observe the absence of the body of the uterus from its natural position; a state of matters as easy to determine in the thin and relaxed female, as it is difficult under the reverse condition. There is a tumor in the vagina, sensible or even tender, and the handling of which is liable to induce sickness; it is roughish on the surface, dark in color, easily made to bleed, regularly rounded in form, and with the base larger than any other part; or only moderately constricted, by the cervix; having little mobility; and occasionally, if prolapsed, showing the openings of the Fallopian tubes, into which a stylet may be introduced. If the finger is passed above the inverted parts, it first reaches the cervix, encircling the base of the tumor; and the finger or bougie introduced between the cervix and the tumor quickly reaches the end of a cul-de-sac all round the latter. Further, the history of the case is peculiar. The reverse of almost all these points is predicable of a polypus; and some of them, if certainly made out, are quite distinctive.

When inversion is partial and the result of polypus, it will probably disappear spontaneously on removal of the cause. In an ordinary case of chronic *post partum* inversion, an attempt should be made to reduce it by direct pressure; the patient being anæsthetized; premising the use of warm baths, local bleedings, purgatives, &c. If this fail, and extirpation of the organ is recommended, it is sufficiently easy of execution. The womb is drawn down between the labia by forceps, and a very tight ligature is applied around it below the cervix, care being taken that no intestine has descended into the inverted organ. Or the mass may be transfixed by a double ligature, and tied in two parts. Or a metallic ligature may be thrown around the mass; and by the aid of Gooch's double canula, or other similar instrument, this may be gradually tightened till it cuts its way through and separates the mass. It occasionally happens that the already existing constriction at the neck of the womb is such as to cause sloughing without surgical assistance.

to retain it in its proper situation; and 3, to protect and support it when it is irreducible.

The replacement, as already remarked, is frequently effected without aid, on the patient assuming the recumbent posture; or, it may be done with more or less force directed against the tumor, always in the direction of that axis of the pelvis through which it is at the time passing. If any difficulty is apprehended, care must be taken to secure complete evacuation of the bladder and rectum before the attempt is made. Sometimes, from the causes already enumerated, it is for the time at least irreducible. But continued maintenance of the horizontal position, and the use of local antiphlogistics if necessary, will generally restore reducibility. In some rare cases of long standing, the reduction, although easily enough effected, cannot be tolerated by the patient; and in others reduction remains altogether impossible.

When the case is recent, and produced by violence, simple reduction, with maintenance of the horizontal position for a few days, will be sufficient. In some examples, it is necessary, in addition to this, to use means to restore the tonicity and contraction of the relaxed and extensile vagina. For this purpose, frequent irrigation of the canal, with cold water, or continued use of astringent ointments and lotions, are very serviceable. Attention must be at the same time paid to heal up ulceration, and to remove leucorrhœa. In most cases, however, the use of a pessary is required. It may be either worn constantly, except when removed for the sake of cleanliness for a few minutes; or it may be laid aside during the night. It should always be as small as is consistent with efficiency; the size ranging according to the conditions of the case. If the perineum is much injured, a bandage may be necessary to retain the pessary. And this must be kept clean, by removing and replacing it; with a frequency varied according to the material of which the pessary is made. A great deal has been written concerning the material of the pessary, and its shape. Different practitioners are in the habit of using different forms, and it not unfrequently happens that after trying several, the patient herself is the best judge of what is most suitable. The ball pessary of boxwood is one of the most useful; the ring pessary is often recommended to married women, but requires watching lest the cervix uteri pass through the ring and become strangulated there. Pessaries more or less cup-shaped, and having a stem attached, are particularly applicable to those cases where the destruction of the perineum renders a bandage necessary. They have the advantage of not distending the whole vagina, as ball pessaries do, and thus preventing that tonic contraction of this canal, which has so much to do with the retention of the organ in its proper place.

In some cases the wearing of the instrument eventually effects a cure; but in others, dependent on relaxation, it may prevent that result; and in these it should not be used till other remedies have been tried in vain.

In all cases, the utero-abdominal supporter of Hull, or some of its numerous modifications, is very useful; if no special cause exist to prevent the patient wearing it. By supporting partly the weight of the bowels, it lightens the pressure upon the womb; the padded understrap, pressing firmly upwards on the perineum, counteracts the prolapse from below; and the machine gives general support and a feeling of security to the patient.

Fig. 287.

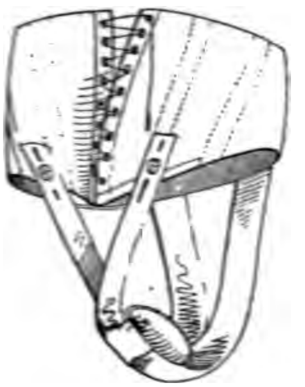
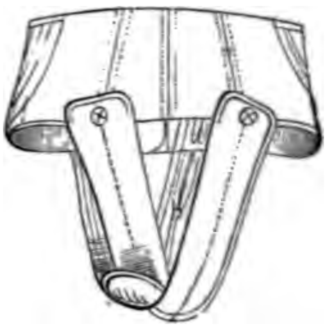


Fig. 288.



[Utero-abdominal Supporter and Perineal Bandage. Front and back views.—From J. B. Brown.]

Operative interference has been resorted to in aggravated cases, and not without some success; it is most applicable to those not exposed to the risk of childbearing. The labia have been made raw, and adhesion between them effected, so as to occlude the vagina, excepting a small passage for the vaginal excretions. *Episioraphy* has also been successful; it consists in carefully paring off longitudinal slips of the mucous membrane of the vagina, and uniting the edges of the wounds by the necessary number of interrupted sutures. Cauterization by the hot iron, or the mineral acids, has also been resorted to for the same purpose.

Finally, if reduction is impossible, a protecting and supporting truss must be adapted to the case, after the manner of a suspensory bandage.

Displacements of the Uterus.

This organ is frequently found lying in an abnormal position. It may be dislocated *en masse*, or its body may be displaced in regard to the cervix; and the most common malpositions are either backwards or forwards, forming, in the one case, an anteversion or a retroversion, and in the other an anteflexion or a retroflexion. The flexions are sometimes congenital. These changes may be simple or complicated. Frequently they coexist with tumors, chronic metritis, hypertrophy of the womb, leucorrhœa, or ovarian irritation. When uncomplicated, they may cause no painful symptom whatever; but sometimes they produce great difficulty in standing or walking for even a short time, disturbance of the functions of the bladder or of the rectum, a feeling of weight and bearing down, a sense of pressure at the anus, pain on going to stool, as well as many of those numerous neuralgic and other symptoms which accompany all the chronic uterine affections.

On passing the finger to the roof of the vagina, the cervix uteri is found more or less displaced from its natural position; and a hard, often tender, rounded tumor is felt through the vagina. This is found to move with the cervix, and may be traced to be continuous with it. In thin and relaxed women, it is possible during examination, by placing the free hand over the hypogastrium, and using the necessary palpation and pressure, to feel exactly the position and relations of the entire organ.

The affection may be farther diagnosed by introducing a bogie or probe into the cavity of the organ, and ascertaining its entrance into the tumor felt through the roof of the vagina. Generally, by means of the probe, the fundus uteri forming the tumor can be depressed or removed from the finger by replacement.

Treatment consists in removing all local congestion and inflammation, combating uterine hypertrophy and engorgment, and arresting leucorrhœa; in short, removing, as far as possible, everything which can be regarded as a cause of the production or continuance of displacement. Maintenance of the horizontal posture, for a length of time, is often of great service as an adjuvant. In some cases, the vaginal, and in others the intra-uterine pessaries may be tried with caution. They are, in the majority of cases, worse than useless.

Stricture of the Cervix Uteri

May be congenital, or may result from inflammatory engorgement and induration. The stricture, if congenital, is generally at the os externum, or at the os internum. If acquired, it may be found at any part of the cervix, or may partially close up some extent of it. It is of rare occurrence; but when present may be the cause of dysmenorrhœa, and sometimes it prevents conception. It is discovered by the symptoms of dysmenorrhœa; or, physically, by the difficulty of passing even a small probe through. Every case, however, where a probe cannot be easily passed, is not therefore to be considered a case of stricture. There may be obstacles to passing a probe into the cavity of the uterus, from many other causes; as flexion or version of the uterus, the presence of tumors, and difficulty of adjusting the probe to the direction of the long axis of the neck and cavity of the organ.

Treatment consists in dilating the cervical canal. This may be effected by a succession of bougies, or of small pessaries with an intra-uterine stem, as is done in stricture of the urethra or rectum. The instrument, however, may be safely left longer *in situ* than in the cognate affections. In fact, it may in some cases be left for days with safety.

If the disease is inflammatory in its origin, however, the pessaries would merely irritate, without producing benefit. In such cases, especially if there is any engorgement, it is better to trust to the ordinary treatment of inflamed and hypertrophied cervix.

Of late, it has been recommended to use the bistouri-caché, or the uterotome of Dr. Simpson—a similar instrument adapted to this particular case. By means of this, the stricture is divided from within outwards; the blade being made to project only to a small extent. If the neck is small, the incision must be proportionally diminished; as there is danger from dividing the vascular trunks which lie on the peritoneal aspect of the proper tissue of the cervix.

Uterine Polypus.

Uterine Polypi may be of various structure. Before their removal, we can in some cases determine their pathological nature by their consistence, by their seat of insertion, by their size, by their history, and by the concomitant symptoms.

The size of the polypus may vary from that of a millet seed, to that of a child's head. In fact, their growth is limited only by the capacity of the pelvis. The largest tumors are fibrous in their structure. The mucous vary much in size; they often are formed by the enlargement and projection of Nabothian follicles, and then contain cavities filled with the glairy secretion of these bodies. Sometimes, the mucous polypus is so small and sessile, as to be with difficulty discovered.

The insertion of these tumors may be at any point on the internal surface or os of the uterus. Very rarely, they are found implanted in the vaginal walls; either having originally sprung from that part, or, as still more seldom happens, having formed a second insertion by adhesion. Polypi have sometimes been observed growing by two roots from the uterine walls—the roots having an identity of structure; and sometimes the second root is merely the accidental result of adhesion.

A polypus may be inserted by a pedicle or stalk; or it may be sessile. The pedicle may be of any thickness; it may be several inches long; or its length may be inappreciable.

Sometimes polypi are found projecting from the vagina, suspended from the uterus by a long slender pedicle. These have been designated by French authors "polypes a pendule;" and are generally observed in women considerably advanced in life, in whom the polypus has grown without occasioning much if any annoyance.

The vesicular, mucous, and cellular polypi may spring from any part of the internal surface of the uterus. Not unfrequently several may be met with at the same time in the cervix, or adhering to the os. The fibrous polypus almost invariably grows from some part of the body of the uterus.

The most urgent symptom of the affection is loss of blood. This is the chief source of the mischief the tumors produce; and the consideration of its arrest is generally what leads to their discovery. It rarely happens that a woman dies directly of loss of blood from this cause; but there frequently results an extreme state of anemia, leading ultimately to a fatal termination. Violent, and sometimes fatal *post partum* hemorrhages are occasionally connected with this as a cause.

Bleeding may take place at the monthly periods, or at irregular intervals. It is frequently brought on by long continuance in the erect posture, by exertion in walking, or by jumping from a height; or it may occur without any assignable cause. It may in its flow resemble the ordinary menstrual discharge; or the blood may issue in a continuous stream from the vagina. The quantity lost has no constant relation to the size of the tumor. The fibrous polypus is generally believed to be the most frequent cause of serious hemorrhages; but these may occur with polypi of any kind, even the smallest. Further, in some cases, there may be no bleeding at all; there may even be amenorrhœa.

In the intervals of hemorrhage, there may be no discharge from the vagina. Generally, however, there is a mucous or muco-purulent secretion; and in cases of large polypi, this is often abundant. Sometimes it is mixed with blood; occasionally it is very fetid, especially if the polypus is ulcerated or breaking up. When the growth is intra-uterine, the blood may sometimes be observed distilling from between the lips of the cervix.

The other symptoms accompanying polypus need no particular description. They are those common to all affections of the uterus. Occasionally, one of these symptoms is very prominently complained of; as pain in the hips, verging to sciatica; also pains in the mammæ.

Examination with the finger generally discovers the growth. If, however, it be very small, care may be required. Sometimes a smooth, soft, and easily movable polypus, with small pedicle, remains undiscovered, although of considerable size; the finger always pushing the growth before it, instead of passing round it, as in general is easily done. If the tumors are small, and lodged in the cervix, they may be better exposed after dilatation of this, by means of a sponge tent. By the same means, an intra-uterine polypus may be detected. The speculum also may be used to expose a polypus for examination by the eye. But, it may be added, that these growths not unfrequently cause no inconvenience whatever; and are discovered only by accident.

Polypus is distinguished from cauliflower excrescence, by the latter having a broad attachment to the cervix, by its free bleeding when touched, by its profuse watery discharge, by its rough and largely granular surface, by its accompanying cancerous cachexia, and lastly, by the results of treatment. Polypus is also liable to be mistaken for inversion of the womb.

The treatment of uterine polypus consists simply in effecting its removal. Bleeding has the same treatment as other forms of uterine hemorrhage unconnected with labor. If violent, and proving dangerous, it may be commanded by the plug. If slighter, it may be arrested by placing the patient in the horizontal posture, keeping her cool, applying cold locally over the vulva and hypogastrium, administering cold enemata, or in some cases, cold and astringent vaginal injections, cautiously, and using internally the common astringent and refrigerant medicines. As in many other hemorrhages, opium is of service.

Removal may be effected in various ways. The quickest, and in most cases the best plan, is the direct use of long scissors, slightly curved on the flat, through the speculum—or without it, using the finger, or fingers, as a guard. When the polypus is large, and can be well seized by a volsella, it may be dragged down to the vulva, and its stalk divided there by knife or scissors. If the growth be very bulky, it may be necessary to enlarge the vaginal opening by incisions. When the stalk or base is large and broad, it is safer to cut near the tumor, rather than near its insertion; on account of the danger of incisions implicating the uterine walls. If difficulty is felt as to the proper site of the incisions, it is preferable to use some of the slower, but in this instance safer methods of removal. And in all cases it is to be remembered that it is not necessary to take away the whole pedicle; for the part left after separation of the polypus quickly disappears. After removal there is rarely any alarming hemorrhage; but it must be carefully watched for, and early arrested.

Small polypi may often be conveniently removed by torsion and avulsion, the operation being the same as for nasal polypus.

A ligature of whip cord, or silver wire, may be thrown around the pedicle, by means of Gooch's well-known double canula, or by any of the numerous modifications of it, which best suits the operator's fancy. The ligature is to be daily tightened, till it cuts its way through the stalk; when both polypus and instrument are to be removed. [The *écraseur linéaire* of Chassaignac (*ante*, p. 391), may be advantageously employed in these cases as a great improvement on the ligature. See Am. Jour. Med. Sci. Jan. 1857, pp. 52, et seq.]

But the direct use of the knife is perhaps, upon the whole, the safest method; as the other modes are tedious, and on account of continuance of fetid discharges from the half separated and decaying polypus, as well as from the irritation of the ligature, there is risk of untoward inflammation being excited—especially phlebitis.

Small, sessile, mucous polypi may be destroyed by nitrate of silver; or a stronger caustic may be used, if necessary.

Extirpation of the Cervix Uteri

Is performed chiefly in cases of malignant disease still confined to this part, and when the peculiarities of its site, and its prominence into the vagina, render complete removal feasible. The operation is sufficiently simple; the only point requiring particular care being to keep the incisions in the cervix below the peritoneal reflections—at the same time removing as much as can safely be done.

The patient is laid on her back, in the position for lithotomy; or flat on her face, with the hips raised, and the legs dependent. The cervix is seized by strong hooked forceps, and gently but determinedly dragged downwards, till it appear at the os vaginæ, through which it is at length drawn. If the patient has never borne children, or if the os vaginæ be small and contracted, it may be dilated by one, two, or three small incisions, made either posteriorly or laterally. The labia are now to be kept separated, and out of the way of the knife, by copper spatulæ, bent into a convenient shape. After the cervix has been drawn down, the insertion of the vagina is made out, in order to judge of the position of the peritoneal reflections, and to avoid including the bladder in the incisions. The necessary amount is then taken away, either by large and powerful scissors, or by the scalpel. Our chief confidence for the arrest of hemorrhage is to be placed in careful and thorough plugging of the vagina by lint.

The amount of bleeding may be inconsiderable; or a large quantity may be lost. And it may happen that a case, otherwise adapted for the operation, may be unable to bear, without the greatest risk, even a small loss of blood. Under such circumstances, a modification of the operation may be resorted to. After dragging down and exposing the cervix, it may be encircled in a strong ligature; or it may be transfixed, as often as may seem fit, by a needle armed with a double ligature; the different parts being separately tied. And the part below the ligature may then be excised with safety. [It may be removed with the écraseur.]

Malignant Disease of the Uterus

May assume one of three principal forms; the corroding ulcer, malignant ulceration without much interstitial cancerous deposit; the cauliflower excrescence, springing from the cervix; and the common cancer of the uterus, which may be scirrhous or encephaloid, very rarely colloid.

The *Corroding Ulcer* is not a common affection. It is distinguished from simple ulceration by its irregular surface, by the fœtor and profuseness of the discharge, by the occurrence of hemorrhages, by the nature of the pain, which is generally severe and lancinating, by the unhealthy malignant local characters, and by the presence of the malignant cachexia of system. From ordinary cancer of the womb it is easily known, by the want of extensive induration, by the mobility of the womb; and often, though not always, want of tenderness to touch is also distinctive. As it advances, it consumes or corrodes the tissues; spreading into the uterine cavity; attacking and destroying the recto-vaginal, and vesico-vaginal septa.

The disease is irremediable. But attempts have been made to arrest its progress while the cervix alone was implicated, by excising the part in the usual way. Frequently, the use of caustics seems to retard advance, to improve the nature of the discharges, and to diminish the tendency to repeated hemorrhage. For this purpose the pencil of lunar caustic, and the actual cautery are of most service. The extreme fœtor of discharge is to be corrected by copious use of the chlorides upon the recipients of the discharge, and as a lotion; used very gently internally, if there is little tendency to bleeding. A weak solution of the chloride of soda is suitable for this purpose. In addition, all the general rules for the palliation of cancerous disease are here applicable.

Cauliflower excrescence is also an unfrequent complaint. It consists in the projection of a malignant mass, which may be of various shapes, into the vagina. It springs from the cervix, and generally has a large base. It is covered by a number of small pedunculated bodies or granulations, which are often in bunches, and may give the general appearance of a head of cauliflower. It is of a bright red color, and easily made to bleed. The general symptoms are those of ordinary cancer of the uterus, but less severe; the watery and bloody discharge is usually excessive in amount. On examination, a tumor is discovered, with the characters above stated; it is felt to be movable and polypoid; and if the disease is in an early stage, the uterus also is not fixed. It is to be distinguished from the polypoid masses of encephaloid which sometimes grow from the interior of the cervix, but along with which there is much diffused cancerous infiltration. If the excrescence be the sole discoverable malignant affection, and if there be every reason to think that it might be completely and favorably extirpated, the operation of excising the cervix should be at once performed. And during healing of the wound, care should be taken, by the use of caustics, to procure healthy cicatrization, and prevent, as long as may be, any tendency to repullulation of the growth. In numerous cases the operation has been succes ful in procuring complete relief, and apparent cure—at least for a ve considerable time.

During the course of the disease, cold and astringent lotions a sometimes of service in checking the amount of discharge.

Cancer of the Uterus occurs at all ages; but increases in frequen from the period of puberty till the end of menstrual life. It prese itself most frequently in the form of scirrhous infiltration, and m rarely encephaloid.

The scirrhous deposit generally commences in the neck, and spre from thence; the encephaloid more frequently attacks other parts the organ first, and sometimes forms projecting and polypoid masses the vagina, or on the cervix and body of the uterus; it is softer to touch, and probably gives rise to bleedings at an earlier period. W encephaloid, too, there is more enlargement and hypertrophy of the n cancerous parts of the organ, than with scirrhus. It sometimes rarely happens that the vesico-vaginal or recto-vaginal septa are f affected with malignant deposit—the disease spreading from thence the cervix uteri.

At the outset, there is frequently much ill-defined derangement of general health, which proves but little amenable to treatment, and of distracts the attention of patient and practitioner from the real seat disease. And even when the malady has made some progress, but still in an early stage, the distance of the severest pains from the wom their lancinating and neuralgic character, and the small quantity, even unusual absence, of discharge, may deceive. But as soon as ul ration is established, the nature of the discharges and their mixture wi blood at once give the alarm.

Patients frequently suffer from pain in the mamma, also in either t right or left hypogastric region, of a wearing kind, with frequent rec rences of stabbing and lancinating shoots; also from fixed pain, oft of a burning kind, in the region of the womb; from pain in the bac from pain and restlessness in the legs; from pruritus of the vulva, a irritation of the bladder; also from constipation, and feeling of beari down or pressure upon the anus. These sufferings may continue duri all the course of the disease, or may be at different times substitut the one for the other.

Before active ulceration commences, there may be no discharge; there may be a secretion of thin, serous, acrid fluid. Sometimes, ev when there is superficial and slowly progressive ulceration, there m be little or no discharge; as is sometimes seen in cases of open scirrh of the mamma. But, in general, as soon as ulceration commences, the appears a large quantity of muco-purulent secretion, which soon becom fetid and mixed with *debris* from the seat of disease. Hemorrha also occurs; either merely at times tinging the discharge more or le or, if a considerable vessel has been ulcerated through, flowing in a co tinuous stream.

On examination in an early stage of the disease, the cervix uteri found enlarged, hard, irregularly nodulated, more or less tender to t touch; the os much increased in size, and more or less dilated. O inspection, the cervix is seen to be generally of an unhealthy red colo and there may be excoriations in the sulci between the nodules; the excoriations being of a deep-red color, and the nodules projecting and often showing very little redness.

Cancer of the uterus is generally of easy diagnosis; patients usually presenting themselves after ulceration, with its accompanying discharges, has commenced, and infiltration into the cervix and surrounding tissues is considerably advanced. It is liable to be confounded with hypertrophy of the cervix, with fibrous tumor of the uterus, and with polypus; and the grounds of distinction have already been given in treating of these subjects.

The disease is incurable; and treatment is confined to palliation. Sometimes the excessive watery discharge may be moderated by the use of astringent lotions, or the application of astringent ointments; especially those having tannin in their composition. If there is much tendency to hemorrhage, no local application can be used with safety. Bleeding, when it occurs, must be arrested in the usual way—horizontal position, cold, styptics, astringents and opiates internally, and plugging if necessary. Fœtor in the discharges is corrected by use of the chlorides. The pains in the hypogastrium and loins may be relieved for a time by blistering, or by cupping; no blood, or a small quantity being taken—according as there is little or much sharpness and frequency of pulse, or the reverse. The local application of ice, or of refrigerating mixtures, through the speculum, has sometimes been of service. But for the pains of this, as of all other forms of cancer, the great remedy is *opium*.

When the disease is seen in an early stage, the cervix still mobile, and presenting only some prominent indurations—and if other circumstances, as the general health and age of the patient, are propitious—an attempt may be justifiable to remove the part by excision, or by strong caustics, used as already described, in speaking of the inflammatory hypertrophy of the cervix, and of corroding ulcer. If this cannot be done, it is prudent to interfere with the parts as little as possible. If there is much cancerous deposit and induration, any violence, such as even introduction of the speculum, is liable to do much harm, by tearing or bursting the lacerable structures and inducing hemorrhage.

Books on Midwifery, *passim*.—Leake, Astruc, Clarke, Dewees, Gooch, Boivin and Duges, Blundell, Meigs, Hamilton, Lee, Lever, Ashwell, Churchill, on Diseases of Women, or of Uterus. Dupuytren, Leçons Orales. Nauche, Maladies propres aux Femmes. Lisfranc, Maladies de l'Uterus. Duparcque, Altérat. Organiques de l'Utérus. Siebold's Frauenzimmerkrankheiten. Meissner, Ueber die Polypen, &c. Bennet on Inflammation of Cervix Uteri. Locock, Art. Leucorrhœa, in Cycl. of Prac. Med., &c. Mackintosh's Practice of Physic. Whitehead on Abortion and Sterility. Waller, Art. Uterus in Cycl. of Pract. Med. Stafford-Lee on Tumors of Uterus, &c. Ingleby, Facts and Cases in Obst. Med. Simpson, Obstetric Works. Newnham on Inversion of the Uterus. Deneux, Tumeurs sang. de la Vulve. Jobert, Traité de Chir. Plastique. Walshe on Cancer. Brown on Diseases of Women admitting of Surgical Treatment (Am. ed. 1856). West on the Os Uteri. Tyler Smith on Leucorrhœa. Matthews Duncan on Uterine Displacements, also on Uterine Bloodletting, Monthly Journal of Medicine, May, 1855. [On Vesico-uterine Fistula, see Madame Lachapelle, Pratique de l'Art des Accouchements, Paris, 1821, 1825. S[illegible]ltz, Mémoire sur les Perforations du Col de l'Utérus et les Fistules Vésico-Utérines et Vésico-Abdominales à la Suite de l'Accouchement, Strasbourg. Jobert (de Lamballe), Traité des Fistules Vésico-Utérines, Vésico-Utero-Vaginales, Entéro-Vaginales et Recto-Vaginales, Paris, 1852. Cases of Vesico-Vaginal Fistula successfully treated, by Geo. Hayward, M.D., Boston, 1851. On the treatment of Vesico-Vaginal Fistula, by J. M. Sims, M.D., Am. Journal, Jan. 1852. Bozeman, N., of Montgomery, Alabama, on Vesico-Vaginal Fistula, with an account of a new mode of Suture, and seven Successful Operations. Louisville Review, May, 1856.]

CHAPTER XXXVIII.

OPERATIONS ON THE BLOODVESSELS OF THE LOWER EXTREMITY.

The Aorta.

Compression of the Aorta may often be of service in cases of pe hemorrhage; assisting both Nature and the surgeon in their hemost means. And it can be readily effected by direct compression of vessel against the vertebral column—a little above, and to the left of the umbilicus—when obesity, abdominal tumor, or intestinal dist sion, do not interfere.

Deligation of the Aorta is very seldom required of the surge Spontaneous obstruction of the vessel, doubtless, has occurred, in a cases, without serious consequences ensuing. But this event is wh different from the abrupt mechanical obstruction by ligature; and, sides, the ligature cannot be applied without the infliction of a m hazardous wound.

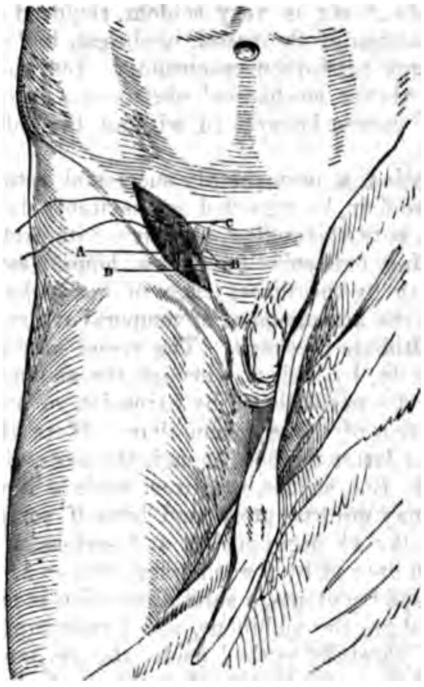
From the operation, a permanently successful result cannot be pected; it must, we fear, be regarded as inevitably fatal. But circ stances may occur, notwithstanding, to warrant its performance with object of protracting existence for a few hours; saving the patie perhaps, from death by the direct effect of hemorrhage, and afford an opportunity for the arrangement of temporal affairs; yet inspiring rational hope of ultimate recovery. The vessel may be reached in of two ways; directly, by incision through the abdomen; or indirect on the outside of the peritoneum, by extension of such a wound a suitable for deligation of the common iliac. Were there a chance successful issue, the latter method, though the more difficult, would c tainly be preferred. But, as it is, the direct mode is likely to be adopt by any one who may unfortunately find himself compelled, by a se of duty, to undertake so unpromising and serious a procedure. T bowels having been opened by a warm purgative, so as to void both th gaseous and their solid contents, a suitable incision is made in the me line, commencing above the umbilicus, and terminating a little below The intestines are carefully pushed aside, the peritoneum is again through, the vessel is exposed, and a ligature applied.

Aneurism of the Abdominal Aorta itself, is obviously remediable o by general treatment. In the nervous, hysterical, dyspeptic, and anen the affection it simulated by great abnormal pulsation in the cours the vessel. It is known by distinct perception of a tumor, which is ıble; by observing that the tumor pulsates equally in all directions; ulsation and bruit being limited to this one part of the vessel, not ıed equally along its course; by the bruit being equally distinct in ıupine and in the erect postures; and by the pulsation being con-, not occasional and intermittent. At the same time it is right to , that the diagnosis of abdominal aneurism, especially in its incipient , is often very obscure; solid tumors, in the neighborhood of the y, partaking of the aneurismal characters very closely.

The Iliacs.

ı account of inguinal aneurism, and aneurism affecting the common ral artery—also on account of hemorrhage not otherwise repressible e *External Iliac* may require deligation. Due systemic preparation ıg been made, the patient is placed recumbent, with the abdominal ıtes relaxed by position; and the surgeon proceeds to operate, with intention of securing the vessel without injury of the peritoneum. y forms of incision have been proposed and followed. That of M. anc is exact, and suitable; exposing the vessel readily enough; not ılated unnecessarily to weaken the abdominal parietes; and, at the time, causing little risk to the spermatic cord and artery, or to the mflex artery and vein. The knife is entered, two lines above, and

Fig. 289.



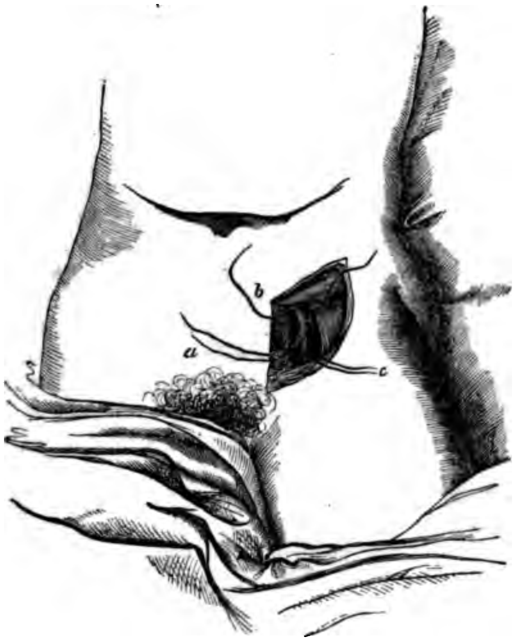
ıre of the external iliac. The wound supposed to be held open. *a*, Artery; *b*, vein; *c*, peritoneum; *d*, spermatic cord.—SKEY, p. 270.

an inch within, the anterior superior spinous process of the ilium ; an being carried downwards, the incision is terminated at an inch above tl level of the spine of the pubes, and about an inch and one-third on i external aspect. By cautious dissection, the abdominal layers a divided ; the fibres of the transversalis muscle—pinched up with forc —being cut with extreme caution. The transversalis fascia is th scratched through, with the point of the knife—near the upper abd minal aperture, where the cord enters the inguinal canal, and where tl fascia may be expected to be especially distinct, as well as loosely c nected ; and, the finger having been introduced through the aperture, this the rest of the fascia is divided in safety. The peritoneum, se rated from the fascia, is pushed aside ; and is held out of the way, eitl by the fingers of an assistant, or by means of a flat copper spatula. T inner border of the psoas muscle is traced with the finger ; and, by pulsation there, the artery will be detected. The vein is found on inner side, and is cautiously separated by the finger-nail or by the po of the knife ; the artery is then more fully isolated, by the same mea and the aneurism needle is passed on the inner side—being inserted tween the artery and vein. The wound is managed in the ordin way ; and, by position of the trunk and limbs, abdominal relaxatio maintained.

This operation is, in general, easily performed ; unless when gr obesity is encountered ; and is, perhaps, the most successful of its cl In aneurism, the point for securing the vessel must necessarily va according to the bulk and site of the tumor.

The Internal Iliac may require deligation ; on account of aneuri of, or hemorrhage from, its branches. Bleeding from deep perin wounds, for example, may not otherwise be restrained. And in fa aneurism of the gluteal or ischiatic arteries, this operation is usua considered preferable to direct incision of the tumor. The securing the vessel, however, is attended with a considerable amount of both d culty and hazard ; and, fortunately, is but seldom required. The tient having been placed as before, an incision is begun over the up abdominal aperture, and carried upwards, as in the line of the forn incision, to the extent of three, four, or five inches ; the extent vary according to the contemplated depth of the vessel, and always lean rather to the side of unnecessary amplitude. The comparative len of the external wound, intrinsically, will have but little effect on success of the operation ; and yet it has a most important bearing there according as it facilitates, or impedes, the accomplishment of expos and deligation. The abdominal muscular layers having been cautio cut through, the transversalis fascia having been divided, and the p toneum having been pushed aside, the sacro-iliac articulation is felt ; there the vessel will be found pulsating, in close connection with its v which is to be avoided carefully. The origin of the vessel is nea opposite the centre of a line, drawn from the anterior superior spin process of the ilium to the umbilicus. Frequently, the external ilia first found—will prove the best guide to the internal. Isolation is effec by the finger-nail, or by the end of the needle. It is not safe to use knife's point at such a depth. The vein, situated posteriorly, is es cially cared for. The wound being then fully opened by assistants, the needle is passed, from within outwards; taking care to avoid the ureter and peritoneum internally, and the external iliac vessels externally; and selecting the point of deligation at a suitable distance from the iliac bifurcation.

Fig. 290.



Wound of the abdominal parietes; supposed to be held aside, showing the iliacs. *a*, A ligature round the internal iliac; *b*, a ligature on the common iliac; *c*, ligature of the external iliac.

The Common Iliac may require deligation, on account of either aneurism or hemorrhage implicating the external and internal iliac arteries; or on account of secondary hemorrhage after high amputation in the thigh. It is reached by an incision similar to that just described; and is, perhaps, as easy and promising an operation as the preceding. The vein is found on the inner and posterior aspect of the artery, on the left side; behind and external to the artery, on the right.

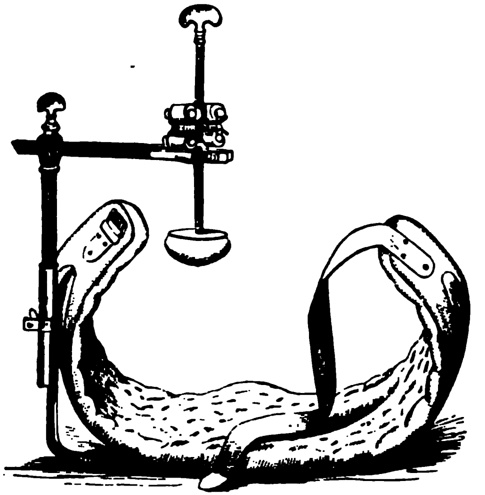
A similar incision, extended upwards, may serve, as already stated, for deligation of the Aorta.

The Femorals.

Aneurism of the Common Femoral, as formerly observed, requires deligation of the external iliac. False aneurism may form in the superficial femoral; and for this the ordinary operation for such an accident is requisite; namely, incision of the sac, and deligation of the artery above and below the wounded part. Aneurismal varix, too, is occasionally met with here, of traumatic origin; a penetrating wound having been inflicted by the grasping of a knife, or other sharp-pointed instrument, between the thighs. It may prove but little troublesome, demand no other treatment than support of the part by bandaging.

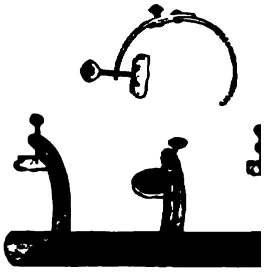
The Popliteal is probably the most common of all external aneuris and, hitherto, the Hunterian application of ligature, to the superfi femoral, has been the only approved mode of treatment. Latterly, h ever, as elsewhere explained, the application of pressure, instead of ligature, has been employed. And experience is, almost daily, gi direct and undoubted testimony to the efficacy of the practice. Tl are some patients, doubtless, who may prove intolerant of pressure; there may be others who prefer the apparent certainty of the knife ligature, to the apparent uncertainty and delay of the compressor. a large number of cases are assuredly capable of cure by pressure perly applied; without risk, with but little pain or inconvenience, without any wearisome amount of privation or confinement. The which is to bear the pressure of the instrument, is protected by a lay thick soap-plaster; and that, again, may be covered by leather. More one compressor is used; or, at least, pressure is made at different part different times; so that the burden of it may not all be thrown on one p but, by being subdivided, may be rendered more tolerable.[1] Using sev

Fig. 291.



[Carte's Instrument for compressing the artery in Femoral or Popliteal Aneurism. (From Fergusson.)]

Fig. 292.



[Alternating Compressor of Dr. Gibbons A light but firm iron well padded within to receive the It is furnished on one side with steel bands curving over, and m two pieces, the upper of which upon the lower, and is fastened clamp, as in Skey's tourniquet: the pieces hold upon their projecting the screws to which the compr cushions are attached. From N. A. Chir. Rev. for March, 1857.]

instruments, along the course of the vessel in the thigh—they may slackened and tightened alternately; or the same instrument may shifted in its site, with a like effect. It is never to be forgotten, that severity of pressure is unnecessary; and that it is not essential to arrest the arterial flow, at the compressed point. And it is also important to remember, that should this mode of treatment fail, it by no means interferes with subsequent performance of the ordinary operation; but, on the contrary, the constitutional treatment suitable for pressure renders the success of subsequent deligation all the more probable. Those surgeons who obstinately adhere to the old operation may adduce as their apology, a series of successful cases so treated. But this is very plainly a contracted view of the subject; and as well might such practitioners prefer successful amputation of the hand to amputation of a finger, for a simple affection of the latter only. A surgeon of the olden time, who had succeeded in curing several successive cases of popliteal aneurism by amputation of the thigh, might very naturally entertain a distrust and dislike of the proposal to treat the same disease by ligature of the femoral; but the naturalness of such an aversion to the minor and modern practice, would not render it one whit the more reasonable or praiseworthy. And an impartial observer will not consider any one justified, in subjecting his patient to serious risk of life, by hemorrhage, suppuration, and gangrene, while he has it in his power to effect cure by a minor means, comparatively devoid of risk, and the failure of which will not militate against subsequent recourse to the major procedure—if necessary. Why should a mode of treatment, which causes little or no risk, always be passed by; or why should an operation always be had recourse to, which may, and not unfrequently does, result in direct loss of life? And the question comes in much force, if it be admitted—and statistics will scarcely warrant even feeble contradiction of this any longer—that the two methods are at least equally successful for the cure of aneurism.

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[1] The mechanical means for compression are undergoing change, and are, doubt destined to become more simple and more perfect. Dr. Carte's instruments for makin curate and elastic pressure on the vessel at the groin, and in the upper part of the thigh efficient and ingenious, but complicated and expensive. Some have used common le weights placed over the vessel, and have found them suitable and satisfactory. For tailed description of the different instruments, see Tuffnell on the Treatment of Aneu by compression, Dublin, 1851.

Recorded facts seem to prove the following conclusions:—1, That, in popliteal aneurism, skilful compression of the femoral is often capable of curing the disease, and that with comparative, and almost absolute safety to life and limb; 2, That the time expended in cure is, on an average, not greater than in the treatment by ligature; 3, That failure by compression does not compromise subsequent recourse to deligation; 4, And that consequently compression, when skilfully employed, being more safe, and not more tedious than the ligature, should in the great majority of cases be preferred. The only disadvantage of compression is the care and trouble necessary on the part of the attendant, with irksomeness and sometimes suffering on the part of the patient. The obvious and only advantage of deligation, on the other hand, is the facility and despatch of its execution, with probable exemption from suffering afterwards by the patient, in the successful cases. The formidable disadvantage is, its proved risk to life and limb.[1]

But should a case occur, suitable for deligation—on account of intolerance or failure of pressure, or on account of expressed wish and preference by the patient—the operation is performed as follows:—The patient is placed recumbent, with the upper part of the thigh suitably exposed. He is directed slightly to adduct and raise the thigh, so as to make the inner edge of the sartorius salient; and, along this superficial femoral is traced. An incision of two or three inch length is then made, in the course of the vessel; so placed, that its c may correspond to the part of the artery where it is intended to the ligature. By cautious dissection, the common sheath is exp and, very carefully, this is opened, and the arterial coats isolated, t requisite extent. In the external wound, the saphena vein is avo in the deep dissection, avoidance of the femoral vein cannot too p nently occupy our regard. The needle is passed very cautiously, to avoid all injury to the vein; which is situated posteriorly, and be partly seen bulging out on the inner aspect of the artery. The usually chosen for deligation is where the vessel is crossed or conc by the sartorius; sufficiently removed from the profunda, as a branch; and not too distant from the aneurismal tumor.

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[1] *Vide* Tuffnell, op. cit.; and Brit. and For. Med. Chir. Rev. Oct. 1851, p. 470. *Vide* also cases by the author, Edin. Med. and Surg. Journal, Jan. 1855, p. 33.

In performing this operation, the surgeon should always make that the tightening of his ligature has a satisfactory effect on the tu for there is the same risk of a high division here, as in the case o humeral artery; and, consequently, two parallel vessels may re ligature.

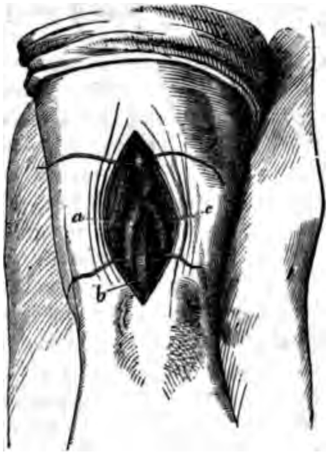
After deligation, a relaxed position of the limb is maintaine obvious reasons.

For aneurism affecting the lower part of the femoral artery, a si operation may be required. For aneurism of the superficial fe in its upper part, the *Common Femoral* may be tied. But this is obviously not favorably circumstanced for successful deligation; in consequence, the equally simple and greatly more certain oper on the external iliac, is to be preferred. In recent wound of the mon femoral, however, with or without the formation of false ane the ordinary rules of surgery are to be upheld; the part is cut di into, and each orifice of the wounded vessel is secured. The fe vein, here on the pubic side of the artery, is carefully avoided.

The Popliteal.

For aneurism, or for bleeding, in connection with the posterior the Popliteal artery may be tied; but ligature of the superficial fe below where it is crossed by the sartorius, is a preferable operation wound of the popliteal itself, however, ligature of that vessel is sary, according to the general principles of surgery. The patient ing been secured in a prone posture, a free incision is made, trav the popliteal space, and penetrating through the skin, areolar t and fascia. The deep dissection is continued cautiously, along th ders of the semi-tendinosus and semi-membranosus muscles. O edge of the latter muscle, the artery may be felt beating; perhaps lapped by it. The vein is superficial, and somewhat external t artery. The nerve is both on a more superficial plane, and o exterior of the mesial line. The vessel is most readily exposed secured in the upper part of its course.

Fig. 293.



Ligature of the popliteal at its upper and lower parts. *a*, The popliteal vein; *b*, the popliteal artery; *c*, the posterior saphena vein. The sciatic nerve, on the outside of the artery, has been accidentally omitted in the diagram.

The Tibials.

These vessels may require ligature, on account of recent wound, or on account of false aneurism formed at some part of their course. For secondary hemorrhage, ligature of the femoral is to be preferred; when recourse to an operation of this kind is deemed expedient.

Ligature of the *Posterior Tibial*, at the upper part of the leg, is an operation of considerable difficulty. Two methods are recommended. One consisting of a direct incision on the vessel, through the centre of the gastrocnemius and solæus; the other reaching the vessel from the lateral aspect. The latter is usually preferred. The limb having been placed on its outer side, a free incision is made between the edge of the tibia and the border of the gastrocnemius; the tibial origin of the solæus is then divided; and, the deep fascia having been cut through, the artery will be found about an inch from the tibia, between the concomitant veins, and with the nerve on its fibular side. Separation of the veins is made very carefully, while the edges of this deep wound are as much retracted as possible by means of copper spatulæ, the knee being bent, and the foot extended, so as to relax the muscles of the calf. The needle is passed from without inwards.

At the lower part of the leg, the vessel is reached much more readily; by making an incision on the inner side of, and parallel to, the tendo Achillis, through the two layers of fascia; opening the sheath, separating the artery from its concomitant veins, and applying the ligature in the ordinary way.

At the ankle, the operation is also simple. A semilunar incision is made on the inner side of the malleolus, about a finger's breadth distant from it; indeed, the finger, applied behind the malleolus, may be a sufficient guide to the knife. The fascia of the leg having been divided, a strong aponeurosis is exposed; this having been cautiously cut through, the common sheath is found; and the vessel having been separated its concomitant veins, the needle is passed from the heel toward

Fig. 294.

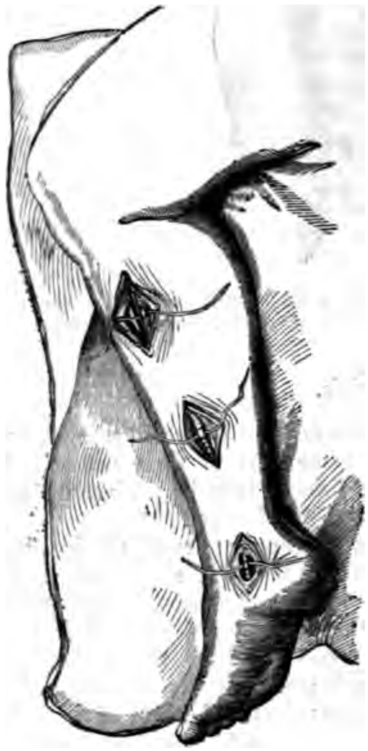


Fig. 295.

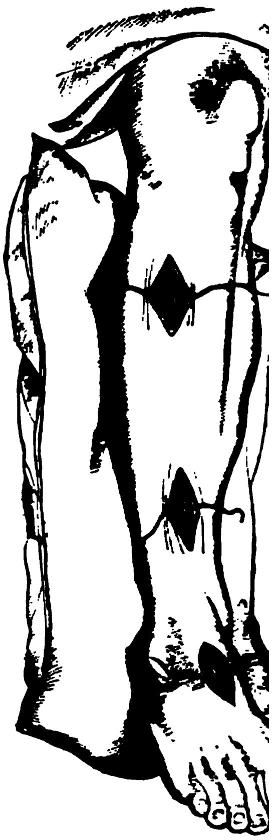


Fig. 294. Ligature of the posterior tibial, at various parts. The wounds are supposed to be held The ligature is under the vessel.

Fig. 295. Ligature of the anterior tibial, at various parts. The wounds are supposed to be held The ligature is under the vessel.

ankle, to avoid the nerve which is situated between the artery a tendo Achillis.

The Anterior Tibial may be tied, either at the upper or at the part of the leg. The superior operation is difficult. A free inci made between the extensor communis digitorum and tibialis an and it is well to make a slight transverse division of the investing at each extremity of the wound. The foot is flexed. The muscles are separated down to the interosseous ligament; and, o the artery will be found. In the middle of the leg, the artery is between the tibialis anticus and the extensor proprius pollicis.

At the lowest part of the leg, a less incision is necessary; the being much more superficial. The wound is made on the fibular the extensor proprius pollicis. The venæ comites, and the anterior tibial nerve, are carefully excluded from the ligature.

Should it seem necessary to secure the vessel on the instep, by regular dissection, it is found by an incision on the fibular side of the tendon of the extensor proprius pollicis.

The *Peroneal artery* may be exposed, by a free incision on the posterior and tibial aspect of the fibula. It is found concealed under the inner edge of the flexor longus pollicis.

Deligation of the arteries of the leg, however, being seldom if ever required except on account of recent wound, all rules for regular dissection may be in a great measure dispensed with; the extent and form of incision depending very much on those of the wound already existing, and the bleeding point being the best guide to the injured vessel.

Manec on Ligature of Arteries, Paris, 1832. Harrison, Surgical Anatomy of the Arteries, Dublin, 1833. Knox, the Arteries, from Tiedemann, 1835. R. Quain, Anatomy of the Arteries, with large plates, London, 1840. Dermott, Illustrations of the Arteries connected with Aneurism, 1841. Tufnell, on the Treatment of Aneurism by Compression, Dublin, 1851. [Erichsen, Science and Art of Surgery, Am. Ed. 1856. Broca, Des Anévrysmes et de leur Traitement, Paris, 1856.]

CHAPTER XXXIX.

AFFECTIONS OF THE JOINTS OF THE LOWER EXTREMI

Morbus Coxarius.

THE hip-joint is liable to the common diseases of articulations; from its position, the exciting causes of synovitis affect it but little, paratively. It is a common seat of porcellanous deposit, inter absorption, adventitious deposit, and other chronic structural cha It is sometimes affected by neuralgia, also; and then is constitute true *Coxalgia*—a term, which, like its analogue Omalgia, has bee properly applied to structural change. But the most important a as the most common affection to which this joint is liable, is chroni organization of the head of the bone; to which the term Morbus rius is applied.

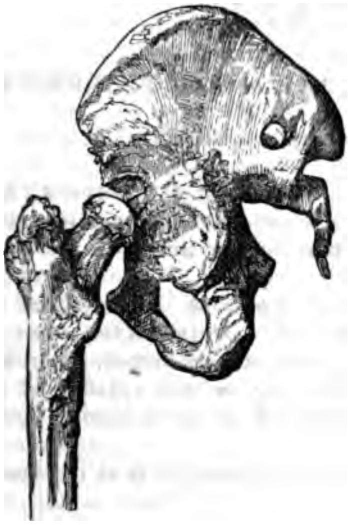
There is reason to believe that the morbid changes usually ob the following sequence. Interstitial absorption takes place in the cellated tissue of the neck of the bone; perhaps with deposit of tub lar matter in the opening texture. After a time, a chronic inflamm process is kindled; and softening and disintegration ensue, affe chiefly that part which is immediately beneath the articulating carti The cartilage is then involved; partly by ulcerative erosion, part necrosis of patches. Matter is effused into the synovial capsule; acute disintegration is established. The cartilage perishes more more; the head of the bone crumbles down; the acetabulum is se arily involved in similar decay; the joint fills, and is reduced to the dition of abscess; the matter makes its way, more or less rapidly at one or more points, through the restraining textures; correspo pointing takes place, followed by evacuation; and then either the of disintegration may advance with a fresh and fatal energy, or may be experienced, and anchylosis may ensue. Such we believe the ordinary course. But the disease may occasionally commen at least be contemporaneous in the acetabulum.

A more rapid and acute destruction of the joint may follow in mation primarily affecting the synovial apparatus. But the term bus coxarius is, in strict accuracy, limited to the chronic and grad nascent affection, which commences in the hard textures.

The disease is conveniently divided into two stages. The first period which is occupied in the incipient change of structure; wi such loss of substance as to cause change of form, and with the sy capsule yet entire; denoted by apparent elongation of the limb.

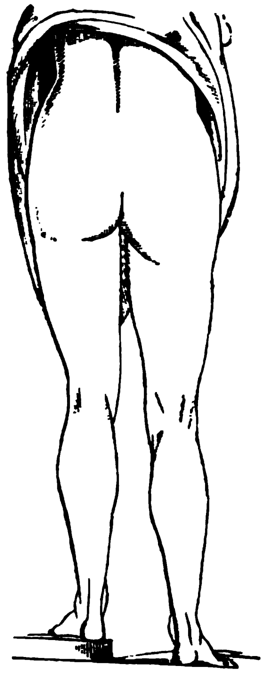
second, corresponding to loss of substance, change of form, and destruction of the joint; indicated by the limb's shortening and distortion. The affection is most common in the young, more especially in those of strumous habit; and it may, or may not, be connected with some external injury as its exciting cause.

Fig. 296.



Articular Caries, affecting the hip-joint.

Fig. 297.



Wasting of muscles shown, with elongation of limb, in disease of the hip-joint. The muscular deficiency is but imperfectly represented; the change of the natal fold, resulting from it, is, however, sufficiently apparent.

The primary symptoms are deceptive. They are such as may attend on dentition in childhood, or on general disorder of health in adolescence; they may simulate rheumatism also; and they are every day mistaken for primary affection of the knee. Obscure pains are felt in the knee and thigh, and occasionally in the hip. The limb is weak, and its weakness is complained of—increasing with exercise; it is felt to be long as well as weak; it is dragged, rather than moved, in walking; in standing it is somewhat advanced, while but little weight is borne on it; and all these symptoms are most observable during fatigue consequent on exercise. An inspection, with the body naked from the waist, is essential. The knee, in which for some time great and almost constant pain has been complained of, may be quite of a normal appearance, and also tolerant of manipulation. The affected limb is decidedly thinner, softer, and more shrunk in appearance than the sound one, and somewhat ad-

vanced in position; resting on the toes and ball of the foot, with
heel raised from the ground. To bring the two heels together req
an effort, with a suitable inclination of the pelvis; and the effort us
causes aggravation of uneasiness. As, in the analogous affection o
humerus, the shoulder is flattened by wasting of the deltoid; so he
found a flattening of the hip, by wasting of the glutei. The fold bet
the nates and thigh—deep and almost transverse in the normal sta
is sloping, superficial, and sometimes almost effaced. Place the pa
recumbent; straighten the spine, and equalize the position of the p
as much as possible—and elongation of the limb will be observed
knees and heels by no means corresponding to each other. Part o
elongation, no doubt, is apparent only—from twisting of the spine
pelvis, which it is impossible altogether to undo; but part of it is re
dependent on relaxation of the ligamentous apparatus, and on incre
accumulation of fluid within the capsule, while as yet no change of
has occurred in the bone; and also in part dependent on the compara
or even actual, disuse of that limb, in bearing the weight of the
during the erect posture.

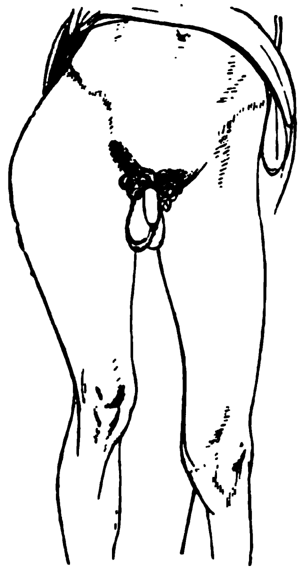
The foregoing symptoms, however, may almost all be found in
delicate adolescent, without disease of the hip. And a further exan
tion is necessary for diagnosis, by jarring the joint suspected. For
abduction of the thigh causes pain in the hip; so does rotation o
limb; and a still more distinct sensation follows concussion, ap
either directly or indirectly—by striking the knee, or the sole of the
or the trochanter major, smartly. There is also tenderness of the g
and behind the trochanter.

Thus far—the first stage—the disease is capable of complete c
the limb being left of its normal length, and restored to its normal
and capabilities. But, too frequently, the morbid process adva
Pain and tenderness increase; swelling of the hip becomes more and
apparent; and the thigh is increasingly flexed on the pelvis. A bul
is observable behind the trochanter; and this bone seems displaced s
what backwards. Enlargement also may form over the groin; and
swellings may be felt to fluctuate. Opening and evacuation ultima
take place; with one of the two results already stated.

In this, the second stage, shortening of the limb is observed; the
resting on the ground, without any advancement of the limb. As
shortening increases, the toes may not reach the ground at all;
turning inwards, may dangle over the opposite member, as in disloca
Or the toes may be everted, as in fracture of the neck of the thigh b
And it is supposed that comparative destruction of the acetabulum te
to inversion, while comparative destruction of the head of the b
favors eversion of the foot. This shortening is plainly symptomati
organic change in the joint; destruction of hard tissues as well as s
deepening of the acetabulum, and abridgment of the head of the fem
And towards such shortening, no doubt, a spastic action of the mus
of the hip contributes somewhat. The hip appears more and more br
and prominent; though really flat and wasted; apparent enlargem
depending on atrophy of the rest of the limb, with twisting of the pel

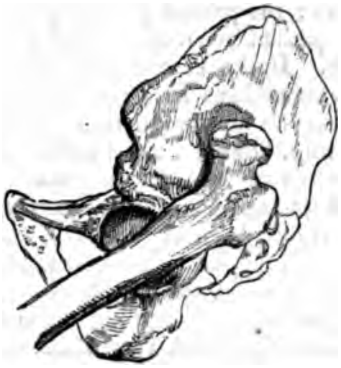
As disorganization advances within, the joint becomes more and more loose; and dislocation may occur, by muscular action alone—without the intervention of a fall or other injury. The dislocation is usually upwards, on the dorsum of the ilium; and this event is of course followed by increase of shortening in the limb, and by a still greater and more

Fig. 298.



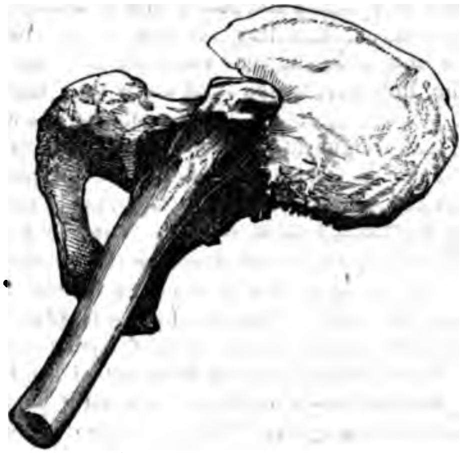
Shortening, swelling, deformity, lameness; the advanced stage of Morbus Coxarius.

Fig. 299.



Luxation of Hip, in consequence of Morbus Coxarius.

Fig. 300.



Cure (?) of Morbus Coxarius by Anchylosis.

marked deformity of the hip. Matter, in general, continues to fo and is evacuated at various points; at the groin, behind the trochar in the thigh. Not unfrequently, perforation of the acetabulum t place; and then the matter may accumulate within the pelvis, fat or it may again make its way outwards, through the sciatic notch, discharge itself at some part of the hip or thigh; or evacuation take place by the rectum. Structural change may advance from b worse; the patient perishing of hectic. Or anchylosis may take pl the patient recovering with a stiff joint, and a shrunk and defo limb. In the case of dislocation—by no means of frequent occurr —it sometimes happens that disease ceases, and the head of the acquires a new recipient cavity on the dorsum of the ilium. More quently, however, the head of the bone seems to act as a foreign in its new site, and causes much inflammatory excitement.

Acute affection of the synovial apparatus in the hip—by some te the Acute form of Morbus Coxarius—shows the ordinary characte synovial disease. There is rapid and uniform swelling of the hip, acute pain in the hip, thigh, and knee, much increased by move and pressure of the hip; the thigh is bent upward, by spastic acti the muscles; and, very often, an apparent shortening of the limb be observed, dependent on twisting of the pelvis; acute fever atte walking and even the erect posture are impracticable; often the slig movement, even during recumbency, is attended with great agony. the disease be not speedily arrested, suppuration takes place; the m is discharged, by one or more openings; and extreme articular dis nization too frequently results, with corresponding disorder of the sy Such a case is met by the ordinary treatment adapted to acute syno Not unfrequently, the affection is of rheumatic origin.

The chronic disease, or true morbus coxarius, is also amenable t general rules of practice. But, as already stated, it is only in the stage that complete cure and restoration to health can be hoped The disease cannot be opposed too soon; consequently tact and ex ence are of much value, in enabling the practitioner to detect with tainty the obscure and insidious commencement. The paramount cation is rest; one, however, which it is often very difficult to mai effectively. The patient must be wholly confined to the recumbent sitting postures; the weight of the body must not, for an instan felt by the affected limb. And the best way of accomplishing th to put the patient to bed, and keep him there; the parents and a dants having been previously enlisted in the cause, by having the im ance of the privation fully explained to them. Should the patient p refractory, a light splint may be applied, as for fracture of the ne the bone. [A carved wood or papier maché, leather, or gutta pe splint, or starch or plaster bandage.] And by some, indeed, the wea of this splint is recommended throughout the whole period of cur order to oppose the decided tendency to flexion of the thigh whic variably exists—increasing along with the disease. But, probably, r is obtained by this spontaneous assumption of posture, as in analo affections of the knee-joint; and, to thwart Nature in this, wer denude ourselves of an important item of the means of cure. Encou flexion, rather, until the disease has begun to subside; and then undo it gradually, ere rigidity has occurred.

A few leeches are applied over the hip—perhaps with repetition, should heat or pain seem to require this; and then moderate counter-irritation is maintained, by inunction of croton oil, or tartar emetic.[1] If the tubercular cachexy be suspected, the suitable opposing constitutional management is put in force—especially cod-liver oil. And by steady perseverance in such treatment, for some weeks, all symptoms of disease may subside; the patient may rise, without any feeling of local ailment; and, cautiously renewing the use of the limb, he may find, in due time, all its functions fully restored. But if the disease threaten to advance, recourse to a higher degree of counter-irritation is expedient; the actual cautery may be applied behind the trochanter; or a seton may be placed either there, or in the groin. Rest and moderate counter-irritation were enough, for the period of absorption; but when structural change, by chronic inflammatory results, has fairly begun, the highest grade of counter-irritation is demanded.

In the advanced period of the second stage, all severity of treatment is inexpedient, there being then no longer any hope of saving structure. When matter has formed, and is plainly discernible, seeking the surface, an early opening is advisable—here as elsewhere; an opening must form sooner or later, and early evacuation may not only give relief, but may also limit disorganization. Then we may hope only for a minor result of treatment—anchylosis; or for gradual cessation of disease, leaving the joint crank, weak, yet movable, and a limb impaired in both its symmetry and function. To conduce towards such ends, we mainly trust to general treatment; keeping the parts steady by means of splints.

Now there can be no harm in undoing flexion completely, and keeping the limb straight. Tension of the joint is not likely to occur; so much disorganization having taken place. And by maintaining the straight posture—by means of the long wooden splint, if necessary—dislocation is rendered less likely, and the position is made more favorable for usefulness after anchylosis. In open disorganization of the joint, the straight splint may not be tolerated; then relief is obtained from the gum or leather splints, suitably applied, as in the advanced affections of other joints.

When from synovitis, imperfectly resolved, stiffness of the hip remains, orthopædic treatment may be applied with advantage; friction, passive motion, and perhaps subcutaneous section of resisting muscles. But in the case of anchylosis following structural change in the joint, the result of morbus coxarius, all such attempts will be wisely desisted from; we ought rather to content ourselves with possession of a partial cure, than incur the risk of return of the disease in an aggravated form.

There are cases, however, in which the propriety of resection may be not unreasonably entertained; when, in an open state of the joint, after spontaneous dislocation, the head of the bone seems to cause much excitement in its new site; when there is good reason to suppose that t disease has all along been chiefly limited to the head of the bone, leavi the acetabulum comparatively uninjured; and when it seems probal that, after removal of the head of the femur, quiet might be restored the joint, and a certain degree of useful motion might be regain Successful cases are already on the records of surgery.[1]

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[1] Part of the remedial action of these counter-irritants—and no slight part—is to increase the security of *rest* to the limb, by rendering all motion externally painful.

The diagnosis of morbus coxarius from other diseases is importa It is simulated by sciatica, by enlargement of bursæ, by lumbar dise by rheumatism, by interstitial absorption of the neck of the thigh b in the aged, and by wasting of the limb consequent on general irritat in the young. 1. Sciatica is known by the pain following the cours the sciatic nerves; the whole thigh is lame; position of the trochant and the length of the limb, are unchanged. 2. Beneath the conj tendon of the psoas magnus and iliacus internus muscles, a bursa is terposed, where the tendon plays on the capsule of the hip-joint. this bursa is liable to chronic enlargement; causing pain in the hip knee, flexion of the thigh, disuse and wasting of the member. The largement may be felt, and is painful on pressure; succussion of the jo itself causes no pain; abduction and rotation of the limb are not atten with inconvenience; but forcible extension of the thigh, and invers of the foot cause pain, by stretching the affected part; and pain is felt when the patient himself flexes the thigh, or averts the foot— tendon then acting directly on the bursal swelling. 3. Disease of lumbar vertebræ, inducing neuralgic pains in the hip and limb, and i peding progression, is suspected when there is absence of the posit signs of hip-joint disease, as well as of those of bursal affection; its existence may be ascertaied by minute inquiry into the history of case, with careful manipulation of the lumbar and sacral regions. Young girls about the time of puberty, or earlier, are apt to fall int state of general disorder of system. Among other signs of this, la ness of one limb may occur, perhaps with occasional pain of the kn and, on examination, the limb may be found smaller than its fellow, muscles soft and flabby, and the hip, consequently, somewhat flatten Abduction, rotation, and succussion, however, are all well borne; on the affected limb the patient may hop round the room, with impuni It were cruel as well as futile, to confine that patient to constant recu bency, to leech the hip, or to bring out crops of pustules over it. It sufficient to enjoin moderate exercise, sea-bathing, friction, and gene tonic treatment. 5. The other affections mentioned, as liable to simul hip-joint disease, are detected by ordinary care in diagnosis; they requ no special marks.

Resection of the Hip-joint.

Till lately, this operation has not had a place in surgery. And it still begins with difficulty and danger. As just stated, in a few cases advanced morbus coxarius it may be deemed warrantable; when the he of the femur is dislocated, and is causing continuance or aggravation of excitement; when the joint is open; when the muscles are wasted, and the head of the bone, consequently, is covered with little else than skin and areolar tissue; and when there is reason to believe that the acetabulum is comparatively free from disease. In connection with this last point, it is well to remember that, after dislocation, the acetabulum may take on a healing action, and, instead of remaining ulcerated, become occupied by a fibrous tissue. Also, in gunshot wounds and other similar injuries, involving the head and neck of the femur only, removal of these parts is preferable to amputation of the whole limb; and may be had recourse to unhesitatingly, with a good prospect of success. No decided rules can be laid down to guide the manipulations. The form and extent of the wound will depend very much on the nature of the openings which already exist. A sufficiency of the diseased or injured bone having been removed, and the wound having been adjusted, the limb is placed straight, and retained in that position by means of the long splint suitable for fracture.

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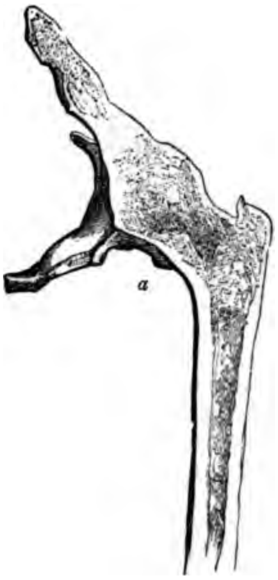
[1] The Lancet, No. 1355, p. 414. In the same Journal, the question of resection, as ap cable to this joint, will be found well stated, No. 1353, p. 362.

Fig. 301.



Cure of morbus coxarius by anchylosis, bisected; at *a*, section might be made, with a view to the formation of a false joint.

In the case of an anchylosed hip, the neck of the bone may be divided; with the view of forming a false articulation at the sawn part, and so restoring motion. Success has already attended the experiment; its

Fig. 302.

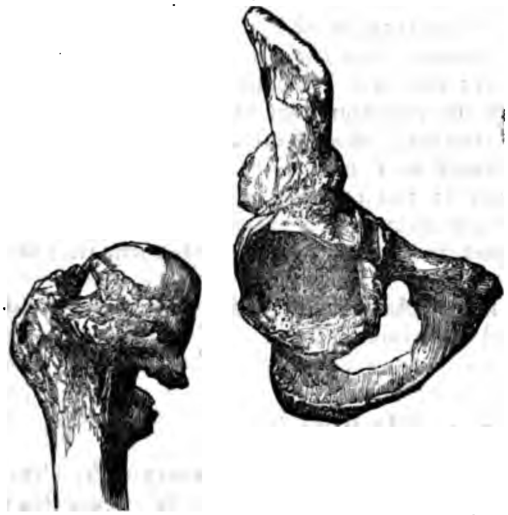


Fig. 303.

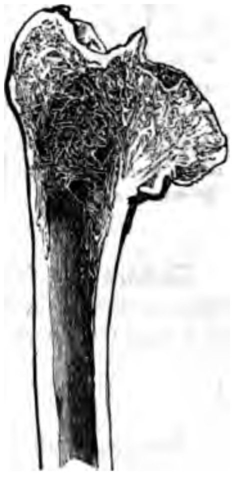


Fig. 302. Head of femur and acetabulum much altered by chronic deposit; causing shortening of the limb, and stiffness of the joint.

Fig. 303. Femur bisected; head atrophied and altered; neck gone; the result of interstitial absorption. Shortening and lameness inevitably great.

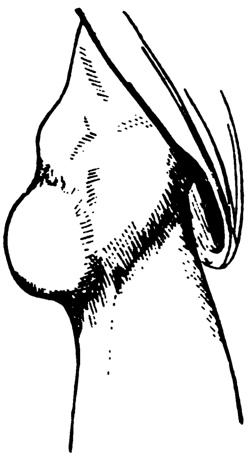
reputation for safety and expediency, however, is as yet by no mea determined.

Change of Form in the Hip-Joint.

The chronic changes of form which frequently occur in the hip-joi have been formerly treated of. By osseous deposit, and porcellan change—but especially by interstitial absorption of the head and ne of the femur—most serious lameness occurs; slowly, but steadily vancing, often under the cover of symptoms characteristic of chro rheumatism in the part. Rest, gentle counter-irritation, and consti tional alteratives—especially the iodide of potassium—constitute treatment; but too often are of little avail.

Affections of the Knee and Ham.

Fig. 304.



Enlarged bursa over the patella; the result of pressure. Housemaid's Knee.

Affections of the knee are not so peculiar as to require separate c sideration. This joint, it will be remember is especially subject to synovitis, chronic acute; to disease of the bone, and of the c tilages; and to the formation of loose bod within the synovial cavity. It is not suita for the operation of Resection.

Housemaid's Knee—that is, enlargement the bursa over the patella—is extremely c mon in housemaids, shop-keepers, and oth who habitually exert much pressure on t part. The affection is usually chronic; so times, however, the case is acute, and apt t to be associated with erysipelas. The ordin treatment is required.

Abscess of the Ham is by no means un quent; and may be connected with exfoliat from the posterior part of the femur. W the portion of dead bone is large, considera difficulty may be experienced in effecting removal; and free incision may be necessa In such circumstances caution is obviously quired, lest injury be done to the artery, ve or nerve.

Tumors may form in the ham. As already stated, it is perhaps most frequent site of external aneurism.

Ganglionic and bursal enlargements form, producing more or l inconvenience; and these may be treated by repeated puncture means of a trocar and canula, or by puncture followed by injection, in hydrocele.

Erectile, fatty, encysted, and fibrous tumors are also met with. T ordinary treatment is required. Removal should be early, before de and inconvenient attachments have been formed.

In addition to the ordinary authorities on diseases of the joints, see Coulson on Dise of the Hip-joint, London, 1841. Hugman, on Morbus Coxarius, &c., London, 1850. [also Alden March, of Albany, N. Y., in Trans. of Am. Med. Assoc. vol. vi, "On the ra of spontaneous dislocation of the hip, as purely the result of morbid action, unaided superadded violence."]

CHAPTER XL.

INJURIES OF THE LOWER EXTREMITIES.

FRACTURES.

Fractures of the Pelvis.

THE bones of the pelvis give way, only under great and crushing force; a heavy weight, for example, passing over or falling on the part. There is but little displacement. The great risk is from injury done to the important parts within. The bladder may be torn, or it may be punctured by a spiculum, as formerly noticed; a portion of bowel may be ruptured; or great extravasation of blood may occur. From such lesions of structure, immediate danger to life results. A risk somewhat more remote follows mere bruises of the interior; inflammation being lighted up within, and advancing both rapidly and untowardly. Or, instead of union, abscess may form at the site of fracture.

In treatment, little is to be done in the way of replacement; the chief care must be directed towards avoidance of motion, and the averting of inflammation. The application of a broad, firm bandage suffices for the former indication; the latter is fulfilled in the ordinary way.

1. A wagon wheel, rolling over the pelvis, may detach *the Crest of the Ilium* from the body of the bone. The upper fragment is displaced inwards; and replacement may be effected by the fingers, ere swelling has occurred. 2. From a heavy and high fall, fracture of the *Sacrum* may result. The fracture is usually longitudinal; and there is no displacement. 3. A kick or fall may cause fracture of the *Coccyx;* and there may be considerable displacement inwards. By means of the finger in the rectum, accurate readjustment may be effected; and it is very obvious that, in the after treatment, both purgation and constipation are to be avoided. 4. The *Os Pubis* may give way in its horizontal body, or in its descending ramus. This fracture is especially hazardous, from the risk which displacement of the sharp fragments, inwards, entails upon the bladder. The necessary treatment was formerly considered. 5. The ascending ramus of the *Ischium* is as frequently broken as any other part of the pelvis. Crepitus is readily felt by the finger in the rectum or vagina; and, by the same means, readjustment of the fractured portions is to be effected. 6. The *Acetabulum* may be split; and injury of the neck of the femur may be simulated. There is no shortening of the limb; and crepitus is felt by the finger in the rectum or vagina—when the pelvis is moved, not during mere rotation of the thigh.

Fractures of the Femur.

I. *Fracture of the Neck, within the Capsule.*—This accident is almc peculiar to advanced years; and occurs more frequently in women th in men. The external dense portion of the bone is atrophied, a me thin shell enclosing the cancellous texture; the neck tends to becoı rectangular, instead of being oblique, in relation to the shaft of the bon and there is, besides, the brittleness of the osseous texture peculiar old age. The accident may be produced by direct violence, as by fa on the hip; more frequently it is the result of indirect violence, as slip or stumble, of comparatively trivial amount. The upper fragm remains *in situ;* the lower fragment is drawn upwards by the musc of the hip, and rests above and on the brim of the acetabulum—furtl elevation being resisted by the capsular ligament. Such displacem may not occur immediately, however; not until spastic action of muscles takes place—it may be, some hours after receipt of the inju and if the periosteal investment be not wholly torn through, the d placement after all may be but slight. When shortening, to a mark extent, occurs suddenly after some hours, there is reason to infer t the periosteal investment, at first but partially torn, has then given w entirely. By muscular action, also, the lower fragment is everted; muscles inserted into the trochanteric fossa, inter-trochanteric line, a trochanter minor, especially conducing to this change.

On examination—best conducted with the patient laid straight on back—the following signs of the injury are observable: There is sho ening of the limb, from half an inch to nearly two inches; but perh not immediate, as just explained. The toes are everted, and the ev sion can be undone by the surgeon, though not without the infliction much pain. Like the shortening, the eversion may at first be but slig In some few cases, inversion is found; but that position is accident resulting from the nature and direction of the inflicting force, and fr absence of the muscular action which ordinarily determines the displa ment, and which might have undone the position in which force had fi placed the limb. The trochanter is higher and flatter than its fell Voluntary motion and power are greatly abridged; forced motion preternaturally extensive. On rotation of the limb, the hand or e placed over the trochanter or on the groin, perceives distinct crepit but only when extension has previously been made, so as to bring t fragments into apposition. By gentle extension, the shortening may undone, and the two heels may be brought together; but on ceasing extend, muscular action soon restores the shortening as before. (rotating both thighs, the trochanters will be found "moving in the a of different circles; that on the injured side rolling on its own ax while the healthy trochanter describes an arc of which the neck for the radius." There is no great amount of swelling; as can readily understood, when the nature of the injured parts is considered.

It is possible that impaction may take place—the upper fragme being driven into the lower; in which case the shortening and eversi will be slight, and crepitus will be absent unless impaction be undone l extension.

Union of this fracture is quite possible, but yet improbable—especially when the bones are unimpacted. The following are the more important obstacles to such an occurrence:—1. There is an obvious difficulty in maintaining accurate apposition; restraining splints cannot be applied to the part itself, and it is difficult to maintain uniform ascendency over the retracting muscles. If the periosteal investment remain partially entire, however, there may be little displacement, and proportionally slight shortening; and, in such circumstances, a better issue may be looked for—as well as in the case of impaction. 2. There must be a want of provisional callus; there being no structure from which it may be produced; and in which it may be formed and sustained; the synovial capsule is obviously barren in this respect. The fractured ends may be said to be steeped in an increased secretion of synovia. 3. Also the definitive callus, which, if uninterrupted, might alone achieve consolidation—as happens in other fractures, when from any cause the provisional formation proves defective—is ever liable to accident, by even slight movement of the parts. 4. The upper fragment, or head of the bone, nourished only through the round ligament, must be of weak power, and ill able to execute the exalted nutritive action necessary for reparation. 5. The age of the patient, and the atrophied condition of the bone itself, are obviously unfavorable to reunion.

Fig. 305.

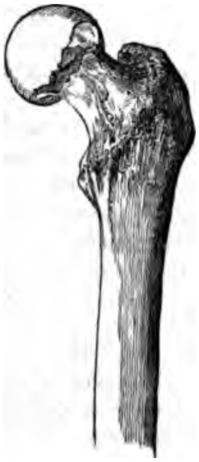


Fig. 306.

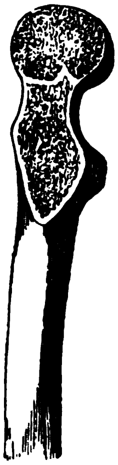
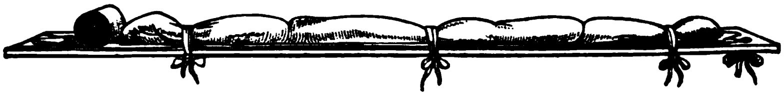


Fig. 305. Fracture of the neck of the femur, within the capsule; thoroughly and accurately reunited. (From the collection of Sir A. Cooper.)

Fig. 306. The same. A section showing the line of union.

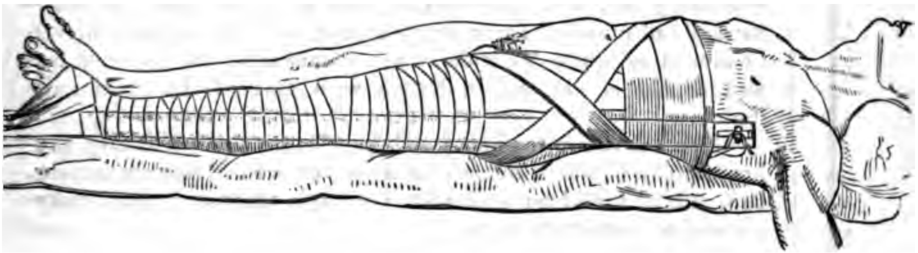
With such adverse complications, it is no wonder that examples of union in this fracture are most rare. And yet circumstances may occur, in which that result may be attempted and expected, with every reasonable prospect of success. When, for example, the patient is comparatively young; when the shortening is slight, indicating but partial division of the periosteal investment; or when, besides this there is absence of crepitus, indicating impaction; when the patient joins heartily with the surgeon in the use of means calculated to maintain apposition, mode of treatment is by application of the straight, light, wooden splint. It should extend from a little below the axilla, to a little beyond the ankle, when the patient is straight and recumbent; and, having been well padded, more especially at the points where pressure is likely to be greatest—at the trochanter, external condyle, and malleolus—it is made one with the limb, as it were, either by bandaging, or by the swathing of a broad, linen sheet. Then a soft shawl, or other suitable band, is passed beneath the perineum, on the affected side; and has both its ends tied on the upper end of the splint—there being two holes placed there for this purpose. A broad bandage or belt is also applied firmly round the pelvis, so as to bind the splint more securely on the limb, and keep the broken surfaces in apposition. By tightening the perineal band, from time to time, the splint is forced downwards; the splint, having been made of a piece with the limb, brings the latter with it; and thus such extension is made, as is likely to prevent retraction by the muscles, and to maintain the limb of its proper length. Indeed, in practice, it is well to have the extension such as to make a seeming elongation on the affected side. On resumption of the erect posture, and use of the limb, such lengthening soon disappears.

Fig. 308.



Splint, ready for application.

Fig. 309.



The splint applied.

[In the previous American editions, Dr. Sargent describes, as in common use in this country, an improvement of the splint originally recommended by Desault, and one which he regards as much superior to that advised in the text. "It was introduced many years ago by Dr. Physick, of this city. It consists of two pieces of light, but firm wood, one for the outer, the other for the inner side of the limb. The external splint is made long enough to extend from the axilla to four or five inches beyond the foot; the upper extremity may be excavated, like the head of a crutch, and should be broader than the lower, the splint gradually tapering. To the inside of the splint, at the distance of the foot and also of the perineum, in consequence of the pressure produced at these points by the extending and counter-extending bands.

Fig. 311.

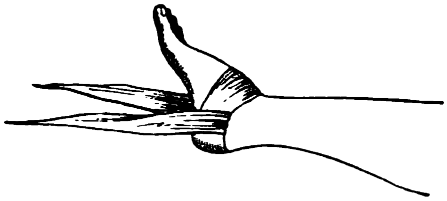
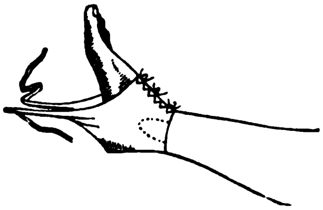


Fig. 312.

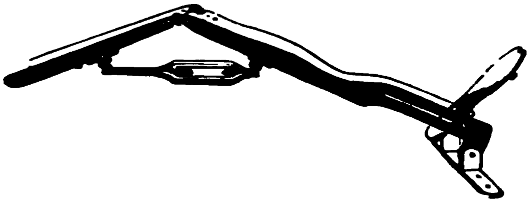


But this is by no means a necessary evil; for it may, in the vast majority of cases, be prevented by attention to proper precautions. Thus, before applying the gaiter or the cravat to the foot, and the counter-extending band to the perineum, the skin covering these parts should be well rubbed with some moderately stimulating liquid, as the spirits of camphor, soap liniment, or whiskey, for the purpose of rendering the skin thicker and more capable of resisting pressure. During the first week of the treatment, these parts should be examined twice daily, and even more frequently if the patient complain of pain or undue itching; and the skin should be rubbed with the liniment, and the extending and counter-extending bands be reapplied in, if possible, a somewhat different position, so that no one point of the integuments shall have to bear pressure for too long a time continuously. Again, in making extension and counter-extension, the requisite traction should be accomplished not through the extending and counter-extending bands, because if these be so drawn upon, a dangerous pressure will be exerted upon the skin of the parts involved; but the surgeon should lay hold of the ankle and the lower fragment near the knee, and make the extension while an assistant draws in the opposite direction upon the superior fragment, and when the desired length has been gained, the whole limb should be compressed by the forcible lateral approximation of the splints, and then the gaiter and perineal straps should be tied; these are to be used not to make the extension and counter-extension with, but simply as aids in retaining what has been gained by other means.

"The patient should be laid upon a hard, level mattress; a bedpan should be used to receive the evacuations from the bowels, or preferably, a fracture bed may be employed, having an aperture in the mattress, and in the bedstead, corresponding in situation with the patient's fundament, and closed at pleasure by a firm cushion upon which the pelvis of the individual reposes; when the bowels are to be moved, this cushion is taken away, and a vessel of the proper kind is placed opposite the hole. Thus all undue motion of the body is rendered unnecessary.

"Generally, the limbs are allowed to rest parallel with each other upon the bed, or the uninjured member may be moved at the patient's pleasure. But when the fracture is above the upper third of the femur, the broken limb should be drawn out from the middle line, so that the axis of the lower fragment may be made to correspond with that of the inside extending from near the perineum, one on the outside extend from the trochanter major, and both reaching the knee. They secured by bandaging, before the long splint is applied. But, in s cases the double inclined plane is preferable—MacIntyre's splint, plified and improved by Liston; the spontaneous rising of the u

Fig. 314.



[MacIntyre's Splint, simplified and improved by Mr. Liston. (From Fergusson.)]

fragment being thus humored, while the lower part of the limb is bro up to it. The trunk should also be somewhat elevated; to rela muscles of the minor trochanter. In children it is well to varnish bandaging; and so to prevent the necessity for frequent renewal of d ings on the score of cleanliness.

VI. *Fracture of the Shaft near its middle.*—Here the signs of injury are self-evident, and need not be detailed. Displacemen usually great; and unless this be undone, and permanently opp most serious deformity must ensue. The retentive apparatus will sist either of the straight splint, or of the double inclined plane, the ter bent to a tolerably acute angle.

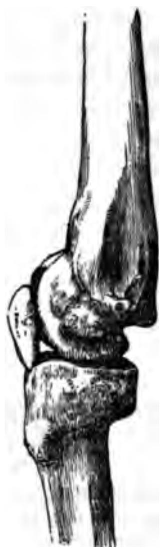
In ill-adjusted cases, not only is deformity great by shortening bulging at the part; the knee is apt to become weak and loose, the ment of the patella proving altogether inert.

VII. *Fracture above the Condyles.*—The lower fragment is us displaced backwards, by the action of the popliteus and gastrocne The upper fragment, pushed forwards, may penetrate muscles and and so render the case compound. The signs of the injury are ob and plain. Treatment is by the double-inclined plane, with the considerably bent.

VIII. *Diastasis*, or separation of the shaft of the bone from epiphysis, may take place in the adolescent; simply, by direct viole or with more or less rotation of the detached part, the limb having twisted by a wheel, or in machinery. Retention is best effected in straight position; with the use of common splints, of wood or p board; or laying the limb in MacIntyre's splint, fully extended.

IX. *Fracture of the Condyles* may take place extending into knee-joint. There is much swelling of the joint, and crepitus is fel the slightest motion. This is also best treated in the straight posit But watchfulness and activity are especially requisite, to avert inf matory action, which is apt to seize upon the synovial capsule, an prove severe. After the first fortnight, to prevent stiffness, gentle sive motion of the joint is expedient; provided the parts are q enough to admit of this.

Fig. 315.



Diastasis of femur. Reunited.

In all fractures of the thigh the limb's use must be resumed very gradually, crutches being used to bear weight at first, lest bending and shortening occur after apparent consolidation. And this precaution, indeed, is necessary in all fractures of the lower extremity—especially in those enfeebled by age or disease, as already stated.

X. *Compound Fractures* of the thigh, especially at the upper part, are prone to an unfavorable issue; by suppuration and constitutional disturbance. No peculiarities of treatment need be specified; further than that the patient's fate usually hinges on the prophylactic and antiphlogistic constitutional treatment of the first ten days.

Fracture of the Patella.

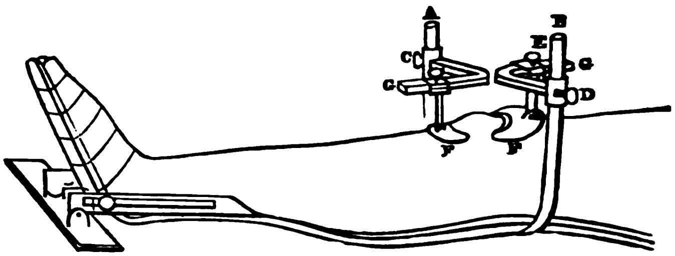
Longitudinal fracture of this bone is the result of direct violence, and may be attended with comminution. Inflammation is liable to occur, implicating the joint; and active prophylaxis, in this respect, is in consequence essential. Bony union readily takes place. No complicated apparatus is necessary; it is sufficient to prevent motion, by a short splint under the ham, lightly retained by bandage.

Transverse fracture is common; the result more frequently of muscular action than of direct injury—as when a person, in full exercise, endeavors suddenly to save himself from falling. In other words, when the knee is bent, and the extensor mass of muscles acts violently, the patella is apt to be broken across, over the condyloid surface of the femur. The lower fragment remains *in situ*. The upper portion is, retracted upwards on the thigh, by the extensor muscles—when the severance of fibrous as well as osseous texture is complete; and a wide hiatus is left between, in which the condyloid surface of the femur may be plainly felt—and even seen. The limb is powerless, more especially when descent in progression is attempted; the extensor muscles proving impotent.

Treatment is usually simple; position often being alone sufficient to effect reduction and retention. The limb is straightened and elevated, so as to relax the extensors on the thigh; a bandage is applied, from the toes upwards, to prevent engorgement of the limb; and, if coaptation be not quite complete, the bandage may be arranged in the form of the figure 8, at the knee, so as to force the fragments gently into apposition. The trunk is also elevated, in a half-sitting posture. Accurate apposition and osseous reunion may be obtained; but this result is not desirable; the knee being apt to prove crank and limited in its movements, and recurrence of the fracture being by no means improbable, under the application of a comparatively slight cause. Short ligamentous union is preferable; affording sufficient firmness and resistance for action of the muscles, leaving the play of the joint unfettered, and proving less liable to recurrence of a solution of continuity. As the consolidation advances, passive motion is gently begun; otherwise muscles may prove slow in recovering their function.

Should peculiarities of the case render such simple treatment in cient, and a ligamentous union of redundant length be threatened, coercive measures are necessary. A broad leather belt is passed r the limb above the patella, another below it; by cross belts, tight as circumstances require, the circular girths are brought together; their approximation includes that of the fragments of the patella.

Fig. 316.



[Lonsdale's Apparatus. A B, Two vertical iron bars, each supporting a horizontal one; these ho arms slide upon the vertical bars, but can be secured at any point by the screws C D. To the hor beams are attached other vertical rods, which are movable, and yet fixable by screws, as at E. to each of these last upright pieces is fixed an iron plate, F F, by means of a hinge joint, which ke patella in place. The foot-piece is movable up and down upon the main body of the apparatus, and made fast at any point, so as to adapt the splint to limbs of different length.]

Lonsdale's apparatus may be worn; which has the advantage of a ing constriction of the limb. In cases of non-union, the constant wea of such an apparatus restores the limb to a great degree of usefu Lately a case occurred to me, in which it was found quite impossib maintain satisfactory apposition of the fragments, on account of a bulging in the thigh, caused by exuberant callus—the result of pre fracture ill adjusted.

[Perhaps the most efficient and convenient mode of retaining in p apposition, the fragments of a transversely fractured patella is th Dr. Neill, of Philadelphia. It consists in the application of one o moderately broad strips of adhesive plaster directly to the skin and below the respective fragments, one set of these strips being p obliquely upwards and the other obliquely downwards, to be attach a posterior splint at points above and below the knee respectively. this way the pressure is secured in the right direction without strangulation of the limb which occurs in the figure of 8 and si bandages; while from being adherent to the skin, the extending counter-extending bands are not likely to yield or to allow displace of the fragments.]

Compound Fractures of the patella have generally an unfort issue; the joint inflaming acutely, and becoming disorganized. unfrequently, amputation is required, to save life.

Instead of the patella giving way, under intense muscular action combined tendon of the extensors of the thigh may be torn asun causing a hiatus at the injured part, with pain, swelling, and lamene the power of flexion being alone retained. Treatment is conducte the same principles as in the case of transverse fracture of the pate

Fractures of the Leg.

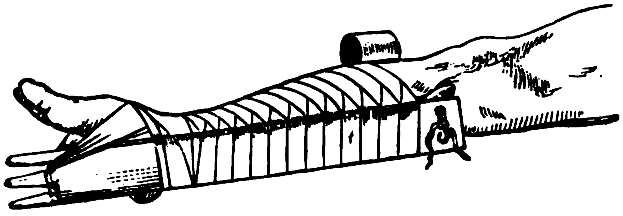
Fracture of the Head of the Tibia is the result of great and direct violence; the fracture extending into the knee-joint. Treatment is as for the analogous fracture of the femur, at its condyles. The limb is placed straight, so that the condyles may act as retaining splints on the fragments; and the limb is also elevated, so as to relax the extensor muscles, which, through the ligament of the patella, act on the lower fragment. Passive motion is expedient, so soon as consolidation has advanced so far as to admit of it.

Fracture of the Tibia immediately below its Tubercle.—The peculiarity of this form of injury is, the tendency to rising in the upper fragment, through agency of the muscles acting by the ligamentum patellæ. The rising is aggravated by flexion of the knee. The limb is therefore placed and retained in the straight posture, and elevated.

Fracture of the Tibia, at any lower point, is best treated on the double-inclined plane. When this bone suffers alone, there is usually but little displacement; the fibula acting as a restraining splint.

Fracture of the Fibula.—This bone most frequently gives way near its lower extremity, at a short distance above the external malleolus. When force is suddenly applied, so as to cause eversion of the foot—as in twisting the foot, on the side of a stone, or in a gutter—this eversion is resisted by the external malleolus; but if the force be sufficient to overcome the resistance, the bone snaps at its weakest point—from two to three inches above the ankle-joint—and eversion of the foot is effected. There is immediate lameness, and the patient may be sensible of something having snapped in the leg; the foot is found turned out; and, if progression is attempted, the patient leans on the inside of the foot, so as to support himself on the tibia. A marked depression is observed on the outside of the limb, at the site of fracture; and, on replacing the foot, and making rotatory movement of it, crepitus may be distinctly perceived. The deltoid ligament is ruptured; and the end of the tibia is necessarily displaced, more or less, from the corresponding surface of the astragalus; not unfrequently it is moved forwards on the dorsum of the foot. Treatment is by Dupuytren's splint; a light piece of wood in breadth proportioned to the limb, and of length sufficient to extend from the knee to a few inches beyond the ankle. It is applied on the inside of the limb; provided with a pad—considerably thicker at the ankle than at the upper part. To a hole at the upper part of the splint a

Fig. 317.



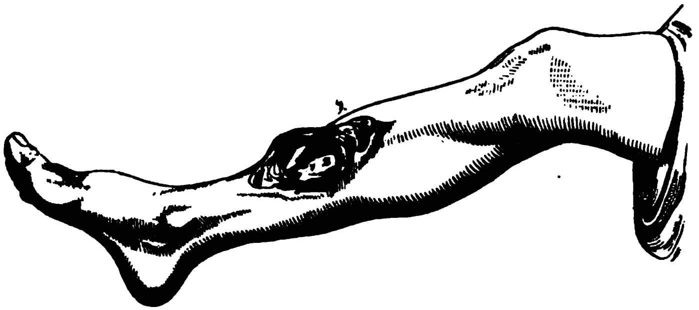
Fracture of the fibula; with the splint applied.

sponding points. In the latter case, the fracture is usually oblique, and the bones give way each at its weakest point; the tibia a little above the ankle, the fibula about two or three inches below its head. This latter form of injury is especially apt to occur, in falls or leaps from a vehicle in motion; and one or other of the sharp fragments may protrude through the integument, rendering the case compound. Treatment is best effected by the double-inclined plane.

Should pressure on the heel be much complained of, the limb may be laid on its outer side, incased in two pasteboard splints, extending from the knee to beyond the ankle. To prevent such undue pressure, during the use of the double-inclined plane, it is well always, when practicable, to suspend the heel and foot by means of a sock—the end of which is hung, by a piece of tape, on a knob placed for this purpose on the upper and outer part of the footboard. It is also well, in all cases, to have the limb, in its splint or splints, considerably elevated; either by slinging, or otherwise.

Compound Fractures of the leg require no special notice. They are, in general, best treated on the double-inclined plane; for the wound, being usually either in front, or on a lateral aspect, may be completely exposed, and frequently inspected and dressed, without the limb being at all disturbed, or the retaining apparatus undone.

Fig. 320.



Compound and comminuted fracture of the leg.

Fractures at the Ankle.

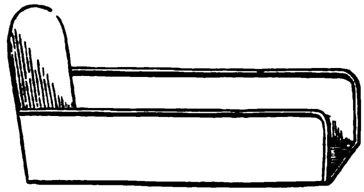
The Internal Malleolus may be broken off by twisting of the foot inwards. The fracture is oblique; the displacement is marked and considerable. The foot is dislocated inwards; presenting its outer edge to the ground. Sometimes, instead of only the malleolus being separated, the fracture includes the whole thickness of the lower end of the tibia—passing obliquely upwards. Replacement having been effected by manipulation, while the limb is flexed, Dupuytren's splint is applied on the fibular aspect of the limb.

The External Malleolus may be detached in a similar manner, by forcible eversion of the foot; but, as already stated, the fibula is more likely to give way at a point somewhat higher—its weakest part. The same splint is employed as in the more ordinary fracture.

The Tarsal Bones are occasionally fractured; usually by inten direct violence. In general, disorganization is such as to leave n of recovery; and primary amputation, consequently, is often req The *Astragalus*, however, may be split and fissured, by a hea received on the calcaneum; there may be little or no displaceme a satisfactory issue may ensue. The part is kept steady by splints, or by means of the double-inclined plane. Sometimes the osity of the *Calcaneum* is snapped by the action of the sural m The symptoms and treatment are the same as in the case of ru tendo Achillis.

[One of the simplest as well as one of the best means of t compound, or other fractures of the leg, says Dr. Sargent, in th vious editions, is to place it in a fracture-box, the sides of whi connected to the bottom-piece by hinges, so that they can be made t cise, when closed, considerable lateral compression upon the leg. cation of the shape of the leg can be secured by the proper posi compression above and below the fracture. In simple injuries, th should be placed upon a pillow; in compound fractures, the box filled with *bran*, in which the le be buried; thus the discharg be absorbed as fast as it is pour (See *Sargent's Minor Surgery*

Fig. 321.



The fracture-box, although nient and nearly always availa however, a rude and not alto reliable substitute for regular s or other lighter and more c fitting apparatus. While fixed own weight and shape in one position on the bed, it does not che movements of the patient; and hence is apt to allow an amount placement and disturbance which, in many cases, requires close wa on the part of the surgeon, and which should be looked for and pr against in all cases. It is much better, as soon as the active infl tion has subsided in simple fractures, and as early as practicable i pound fractures, to employ at the same time with the box a plaster, or gypsum bandage, or the felt, gutta percha, pastebo similar material, as an additional and more efficient dressing. the splints now employed, the woven wire-gauze splint is one of the

Fractures of the Foot.

Fractures of the metatarsal bones, and phalanges, are seldom e but by a crushing force. Their issue is rarely prosperous, esp when compound. The metatarsal bones, after readjustment, requ splints. It is sufficient to keep the foot at rest and elevated. Th langes, if not demanding immediate amputation, are arranged a tained by small splints, as in the case of the analogous injuries superior extremity.

DISLOCATIONS.

Dislocation of the Pelvis.

From heavy and high falls, it has occasionally happened that the *Os Innominatum* has been displaced upwards; separated from the sacrum, at the sacro-iliac junction, and from its fellow at the symphysis pubis. The following are the diagnostic marks of the injury: The limb of the affected side is shortened and powerless; yet the signs both of dislocation and of fracture of the thigh-bone are absent; and the limbs, when each is measured from the anterior superior spinous process of the ilium, are quite of the same length. The spine and horizontal ramus of the os pubis are unusually elevated; forming a hard ridge in the ordinary site of the iliac fossa. The anterior superior spinous process, and the crest of the ilium, are on a higher level than those of the opposite side. By examination from the rectum, the tuberosity of the ischium will be found raised, and nearer the mesial line; and the descending ramus of the os pubis will probably be on a plane considerably posterior to that of the sound side. The fold of the nates is higher than on the other side; and, on the injured side of the sacrum, a depression will be felt, at the junction of that bone with the ilium. More or less difficulty may be experienced in evacuating the bladder.

Should the nature of the case be distinguished in time, moderate efforts may be made for readjustment, by extension of the limb, and forcing the ilium downwards with the hand. The bladder is relieved by the catheter, as often as circumstances may require; and a flexible catheter is likely to pass more readily than the metallic instrument. The same attention to the state of the internal organs is required as in the case of fracture of the pelvis. Indeed, fracture of the os pubis is not unlikely to be associated with such an accident. Prognosis is unfavorable.

Separation of the *Symphysis Pubis* is said occasionally to occur, in difficult labor. It may also result from direct injury. Displacement is not great. By a broad belt the parts are kept unmoved, as well as in apposition.

Dislocations of the Hip.

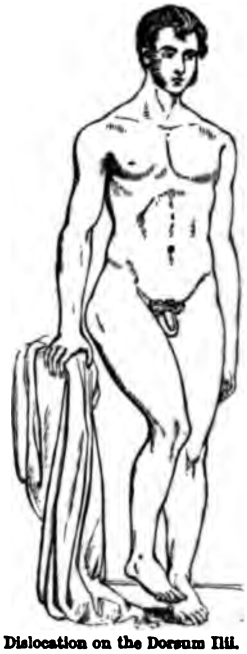
The head of the femur may be displaced, in various directions. The displacing force is usually indirect; but the accident occasionally results from direct blows or falls upon the hip. It may take place at any time of life; but most frequently affects the young or middle-aged adult. In youth it is rare—except in the congenital form; in old age, fracture of the neck of the femur is much more likely to occur.

1. *Dislocation upwards on the Dorsum of the Ilium.*—This is by far the most frequent form of the injury; usually resulting from a fall under a heavy weight. Examination is best made in the erect posture. The limb is shortened, from an inch and a half to two inches; and is turned inwards, the toes resting on the opposite instep, with the knee advanced somewhat in front of its fellow. Motion is much abridged, especially in an outward direction. The trochanter is less prominent than it should be, and is also preternaturally near to the anterior superior spinous pro-

cess of the ilium. If there be not much swelling, the head of the b may be felt rolling in its new site, during rotation of the knee inwa There is also diminution of roundness in the injured hip.

Fracture of the neck of the femur is the injury most likely to be taken for this dislocation. Diagnosis rests on the following poi In dislocation, the motions of the limb, both voluntary and forced, abridged; there is invariably inversion of the foot, and this inve cannot be undone, until reduction has been effected; the toes ma moved round forcibly, but the whole body turns with them; on exte being made, the normal length of the limb cannot be restored, unt duction has occurred; and then there will be no recurrence of the s ening, unless fracture of the brim of the acetabulum exist. True pitus is felt only in the case of fracture. The occurrence of disloc is much more rare than that of fracture; and, while dislocation occur at any age, fracture within the capsule seldom if ever is f under the age of fifty. Fracture external to the capsule is at known, by the distinctness of the crepitus—when extension and rot are made, and when the trochanter is pressed inwards.

Fig. 322.

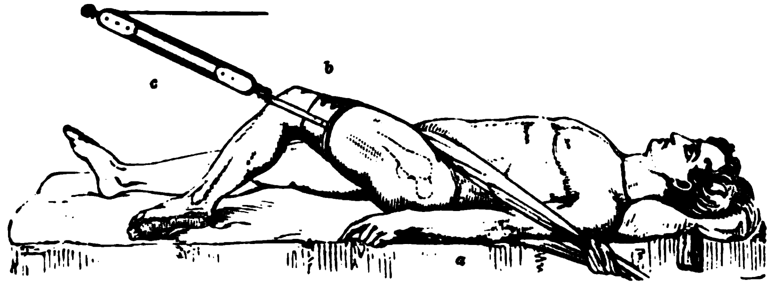


Dislocation on the Dorsum Ilii.

Reduction is effected, with or without the aid of pulleys, and t auxiliaries, according to the date of the injury, the robustness of patient, and the other circumstances of the case. The patient is pl recumbent on his back; and extension is made obliquely across the o site limb; the thigh crossing its fellow a little above the knee. laque, to which the pulleys are attached, is applied either above the k or at the ankle, as the surgeon may prefer. Counter-extension is made, by means of a strong belt—well padded—passed beneath the perineum, and secured to a fixed point behind the patient. When extension has been made for some time, the limb is rotated outwards.

It is seldom that we shall find it expedient to forego the use of chloroform; and when this is employed, no other mode of reduction need be tried than the simplest—that just stated. But, if anæsthesia from peculiar circumstances be not available, another method may be tried, if the first fail. The patient being placed erect—resting his weight on the sound limb, stooping over a firm table, and having his pelvis fixed securely thereon—the surgeon takes hold of the foot of the affected limb with one hand, and, flexing the leg on the thigh, presses steadily with the other hand on the popliteal space, downwards. After extension has thus been applied for some time, sudden rotation is made on the hip, and the bone may, thus simply, move at once into the acetabulum.

Fig. 323.



Mode of reducing dislocation shown. At *a*, counter-extension made; at *b*, the laque attached to the thigh; at *c*, the pulleys.

After reduction, the patient is placed gently in bed; and no retentive means are necessary, unless the patient be careless, or violent, by delirium or otherwise. Then it is well to secure the two limbs together, by bandaging, at the knees and ankles; pads being interposed at these points. If, as rarely happens, the upper edge of the acetabulum have been broken, retention is effected with difficulty; and it is necessary to maintain permanent extension of the limb, by means of a long splint with perineal band, as used in the case of fracture.

II. *Dislocation backwards, into the Ischiatic Notch.*—In point of frequency, this form may be placed next in order. "The head of the thigh-bone is placed on the pyriformis muscle; between the edge of the bone which forms the upper part of the ischiatic notch, and the sacro-sciatic ligaments; behind the acetabulum, and a little above the level of the middle of that cavity."[1] The accident results from the application of force, while the body is bent forward on the thigh, and the knee is pressed inwards. The signs bear a general resemblance to those of the preceding injury; but occur in a minor degree. The shortening is from half an inch to an inch. The foot is inverted, and the great toe rests on the ball of the great toe of the opposite foot. The trochanter is be-its fellow, the toes usually showing neither inversion nor eversion. The thigh is much abducted, and cannot be brought near its fellow. The trunk is bent forwards, during maintenance of the erect posture; and the tense ridge, formed on the inside of the thigh by the stretched psoas and iliacus muscles, can generally be both seen and felt. The trochanter is flattened and depressed. The head of the bone can be felt—only in thin patients, and in the absence of swelling—by pressure on the inner and upper part of the thigh towards the perineum. The position of the limb somewhat resembles that which attends on the first stage of morbus coxarius; a mistake in diagnosis would be fraught with the most direful consequences; but, with ordinary care, such a misfortune is not likely to occur. Elongation of the space between the anterior superior spinous process of the ilium and the trochanter major, is of itself a sufficient test of the dislocation.

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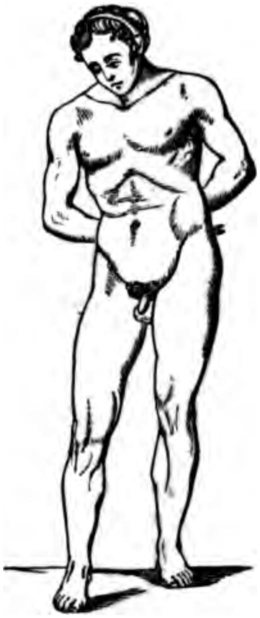
[1] Astley Cooper on Dislocations.

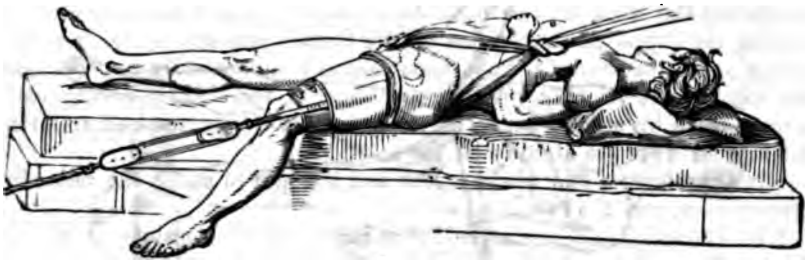
Fig. 325.



Dislocation into the foramen ovale.

The patient is placed flatly recumbent; and counter-extension is made across the pelvis, by means of a strong belt passed round it. Extension is applied in the opposite direction, at right angles to the pelvis; the pulleys being attached by means of a loop passed under the upper part of the thigh, and with one portion of the loop passed over the belt whereby counter-extension is made. Extension is exerted gradually, until the head of the bone is felt moving from its abnormal site. The surgeon then, passing his hand behind the ankle of the sound limb, grasps the ankle of the dislocated member, and draws it inwards, towards the mesial line of the body. The foot should not be raised, lest the low; his body being at the moment bent backwards. The head of the bone is then forced upwards and forwards, on the horizontal ramus of the os pubis. The limb is shortened to the extent of an inch. The knee and foot are turned outwards, and cannot be rotated inwards. The head of the bone may be distinctly felt and seen, forming a globular tumor, resting above the level of Poupart's ligament, on the outside of the femoral vessels; and obedient to the motions of the thigh.

Fig. 328.



Reduction of dislocation on the pubes.

The patient is placed flatly recumbent on a table, with the affected limb projecting over the edge. Counter-extension is made in the ordinary way, by the perineal band—secured behind, and a little above the level of the patient. Extension is made in a line behind the axis of the body, carrying the thigh downwards and backwards. After some time, the head of the bone is lifted over the margin of the acetabulum, by means of a towel placed under the upper part of the thigh. And rotation inwards is also likely to be of service.

Anomalous dislocations of the Hip.—Besides the ordinary varieties of dislocation, the following have been observed: 1. The head of the femur has been displaced, so as to rest on the anterior superior spinous process of the ilium—or rather on the space between the two spinous processes of that bone, the trochanter major lying on the dorsum; such displacement having been determined by the direct effect of the force, and muscular action having, for some cause, failed to modify displacement in the usual way. 2. Or, in like manner, the head of the bone may rest on the anterior inferior spinous process of the ilium, the trochanter major lodging in the acetabulum. 3. The head of the bone has been found resting on the tuberosity of the ischium, and also upon the spinous process of that bone.

[Dr. Reid, of Rochester, N. Y., who has so honorably distinguished himself by reviving and methodizing the mode of reducing luxation of the femur by manipulation without extension, objects to traction on the femur, as "force misapplied," as unphilosophical, and contra-indicated by the anatomy of the joint, and by the plainest laws of mechanics. The difficulty of reduction by direct extension of the femur, he attributes chiefly to the resistance of the six rotator and abductor muscles, which are put upon the stretch, and which are incapable of further extension, without danger of rupture. In addition to these impediments, however, he is informed by Professor E. M. Moore, that experiments on come quiescent, and to accommodate themselves to the new position of the bone. The foot and leg must be kept still also, and firmly directed towards the opposite thigh ; for, if we relax or carry it outward, we shall roll the head of the femur away from its resting-place and proximity to the acetabulum, and permit, if not provoke, the muscles, as already described, to draw it downward into the foramen ovale or backward into the ischiatic notch or dorsum ilii. After a short time we may repeat our attempts, as above described, and in all suitable cases—that is, cases of dislocation on the dorsum or in the ischiatic notch, and of not over four to six weeks' standing—we may confidently anticipate a speedy and favorable issue."

In order to show the practical importance of strict attention to the detailed steps of the process recommended in placing and moving the dislocated member, he calls attention to a fact, already observed by him, but repeatedly shown upon the dead subject by Dr. Moore, and stated by the latter in the following terms:

"When the muscles about the joint are entire, if the femur is flexed on the trunk and abducted, the glutei muscles are stretched, and then their broad tendons compress the trochanter, and powerfully assist rotation and abduction, to urge the head of the bone into the socket; very much as might be done by the hands, if placed over the trochanter, but much more efficiently. But if the thigh is brought down to a right angle or lower, the tendons of the glutei are relaxed, and we thereby lose all the advantage which they would otherwise afford us—another cogent reason for not bringing down the limb towards the straight position before the head enters the socket."

This mode of reduction is appropriately called the *flexion method* by some surgeons, and the process is well summed up, according to Druitt (7th ed., 1856), by a writer in the London Med. Times (30th June, 1855),—"*lift up, bend out, roll in.*" In the words of Druitt himself, more clearly, and almost as briefly written, "The knee must be bent on the thigh, and the thigh on the pelvis; the surgeon then grasping the ankle with one hand, and the knee with the other, causes the thigh to perform a circular movement of abduction, finishing with a slight rotatory movement, when the bone will probably be replaced." Anæsthetics may generally be dispensed with in this operation. In fact, complete relaxation from anæsthesa, and of course from any other cause, according to Dr. Reid's theory, "instead of being an advantage is a detriment, just so far as it prevents the contraction of the muscles required to replace the bone." (See Art. *On the treatment of Dislocation of the Hip by Manipulation only.* By W. W. Reid, M.D., of Rochester, N. Y. New York Jour. of Med., July, 1855.)]

Dislocations of the Knee.

Dislocations of the knee-joint are caused only by great violence, and are rare. The displacement cannot occur without much disruption of the retaining parts; and, in consequence, replacement is generally effected without difficulty.

The *Tibia* may be luxated from the femur, in four different directions:

1. *Backwards*, behind the condyles of the femur; causing shorteni the limb, prominence of the condyles in front, depression of the liga of the patella, and bending of the leg forwards. 2. *Forwards.*– condyles are thrown back, and compress the popliteal vessels; the and patella are elevated in front; the limb is shortened and sli flexed. These dislocations are complete; the other two are only pa 3. *Inwards.*—The internal condyle of the femur rests upon the ext semilunar cartilage; and the tibia projects plainly on the inner si the joint. 4. *Outwards.*—The external condyle rests on the semilunar cartilage; and the projection is on the outside of the joi

Reduction is in general readily effected, by extension and coapt Antiphlogistics are required subsequently, to ward off or modi intense inflammation, which is apt otherwise to ensue after so s an injury. The compound luxations usually require immediate tation.

Gradual displacement of the knee, by muscular action, in the c advanced structural change, has been already considered.

The Semilunar Cartilages are sometimes displaced, by twistin joint; as when a person in walking, with the foot everted, strike toes against an obstacle; or when the foot, in walking, becomes sud caught in a crevice or hole. Perhaps there is a predisposing cau operation; namely, unusual relaxation of the retaining ligamen these cartilages. The cartilages are pushed from their normal si the condyles of the femur, which then come in direct contact wit head of the tibia. The limb is immediately rendered stiff, and inca of bearing weight; and a sickening pain is felt. Extreme flexion joint, by disengaging the parts, usually suffices for restoration normal state; the cartilages, by their elasticity, seeking their own when free. The production of such flexion may require force, painful. After the joint has remained a little in that position, the is brought down again with a sudden movement. The knee re weak and swollen for some considerable time—perhaps the seat of matic pains; and the use of a knee-cap is expedient. If chronic tural change threaten to ensue, that must be opposed by the ord means.

Dislocation of the head of the Fibula is a rare accident. It may place, by violence, either backwards or forwards. Reduction is ef by direct coaptation; and bandaging sufficiently effects retention. Sl displacement depend on relaxation of the retaining ligament, the sure of a knee-cap or bandage is necessary; with stimulation of the to restore the normal state if possible.

Dislocations of the Patella.

The Patella is liable to be displaced, in various directions; b ternal violence, applied directly or indirectly. But such accident rare. 1. *Outwards.*—This is the most common; and is apt to occ persons who are knock-kneed. The bone is thrown outwards on external condyle, and forms a manifest projection there; the kn incapable of flexion. 2. *Inwards.*—This is the result of direct inj the bone being struck on its outer side, while the foot is turned inwards. The malposition is the reverse of the preceding. Reduction in either case is effected by raising the leg, so as to relax the extensor muscles on the thigh, fully; at the same time, with the hand, forcing the bone back to its place.

3. The patella may be displaced by *Semirotation;* one edge resting on the middle of the articular surface between the condyles of the femur, while the other projects beneath the tense integument. Reduction in this case is to be effected by flexing the knee to the utmost; so as to free the bone, and admit of its being drawn into its normal position by the action of the extensor muscles. Should this means fail, it may be expedient to divide the ligamentum patellæ, by subcutaneous incision.

4. The bone can be displaced *Upwards*, only on division of the ligamentum patellæ, by wound or tear. The treatment is as for transverse fracture of the patella. 5. Slight displacement, *Downwards*, may follow rupture of the tendon of the rectus muscle.

Dislocations of the Ankle.

I. *Dislocation of the Tibia inwards.*—This, as already stated, usually coexists with fracture of the lower end of the fibula. The foot is everted; and the internal malleolus projects greatly. Reduction is effected by extension of the foot; while the limb is bent at a right angle, so as to relax the gastrocnemii muscles. And this flexed position of the leg, be it remembered, is essential in the treatment of all luxations at the ankle. Replacement having been accomplished, Dupuytren's splint is applied on the inner side of the limb; and should it seem necessary, for complete retention, a minor splint may be placed on the outer side also.

II. *Dislocation of the Tibia forwards.*—This, too, attends on fracture of the fibula. It may also occur independently of fracture; but then the fibula is usually displaced along with it; and the case is one of luxation of both bones.[1] The tibia rests on the upper surfaces of the navicular and internal cuneiform bones, and on a small part of the anterior surface of the astragalus. The foot is fixed, and appears much shortened; the heel is proportionately elongated; the toes are pointed downwards; there is a marked depression in front of the tendo Achillis; and the end of the tibia is felt to be resting on the middle of the tarsus. Treatment is as in the former case; a splint being applied on each aspect of the limb.

A minor form of the injury may occur; the end of the tibia resting partly on the navicular bone, and partly on the astragalus.

III. *Dislocation of the Tibia outwards.*—In this case, the fibula is associated in the displacement; and both bones form a manifest projection on the outer aspect of the joint. The foot is turned inwards, its outer edge resting on the ground; and the toes are pointed downwards. The internal malleolus is obliquely fractured and detached. Treatment is as in the other cases. But especial watchfulness is necessary, as to the consequences; this form of injury being always the result of much violence, and inflammation being consequently apt to ensue.

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[1] I have seen the tibia displaced forwards and inwards—the dislocation all but compound—while the fibula remained not only in its place, but entire.

IV. *Dislocation of the Tibia backwards* is extremely rare. Th of the bone rests on the os calcis, in front of the insertion of the Achillis; the heel is shortened, and the foot is proportionately elon

The foot has also been found forced upwards between the tibi fibula; these having separated. But this may be regarded as mer aggravation of dislocation of the tibia inwards.

The treatment is still by extension of the foot, during flexion leg; and by the application of lateral splints.

V. *Compound Dislocation of the Ankle.*—This is the most co of the compound dislocations of joints; and usually takes place in The patient having fallen forcibly, with the foot everted, the end tibia is driven through the integuments on the inner aspect of the and protrudes to a greater or less extent. Even in extreme cas posterior tibial artery generally escapes untorn. This acciden occur to any one; but is especially frequent in adults of advanced and intemperate habits; and, in these, but a slight amount of vi would seem to suffice for its infliction. The complication of de tremens is not unfrequent.

Reduction is effected as in the simple form; and subsequent ment is conducted according to general principles. Should ancl occur, motion and usefulness are considerably regained, by compen increase of movement in the tarsus. According to the high aut of Sir Astley Cooper, immediate amputation will probably be expe "when the ends of the tibia and fibula are very much shattered; in addition to the compound dislocation of these bones, some of the bones are displaced and injured; when one or other of the tibial a is divided, and cannot be secured without extensive enlargement wound, and disturbance of the soft parts; when the common integu with the neighboring tendons and muscles, are considerably torn; the protruded tibia cannot by any means be reduced; and wh constitution of the patient is enfeebled at the time of the acciden not likely to endure pain, discharge, or long confinement." The tation suitable is that of the ankle-joint.

Secondary hemorrhage may ensue from the posterior tibial, in otherwise affording a chance of cure. In such circumstances, li of the superficial femoral may be performed, if all the other po the case are favorable. But if there be profusion of unhealthy disc manifest indication of ulceration in the joint, or signs of incipien grene in the wound and on the foot—then amputation is to be perf with as little delay as possible.

Dislocations of the Tarsus.

I. Of the Tarsal range of bones, the *Astragalus* is the most freq displaced by violence. Its dislocation may be either complete or p and it may take place in various directions. 1. *Forwards.* This far the most frequent form. When the ankle is fully extended, a amount of the upper articular surface of the bone is exposed; and a fall, a powerful shock should then be applied to the calcaneu astragalus is very apt to be loosened and displaced—forwards a wards—coming to rest on the navicular bone. Sometimes the dis ment is forwards and outwards; the bone resting on the os cub

The nature of the accident is at once declared, by the manifest appearance of the astragalus in its abnormal site. Reduction is to be attempted by persevering extension of the foot, with the leg flexed; while the bone is pushed backwards to its place. And, with the aid of chloroform, we shall not despair of success in all recent cases.

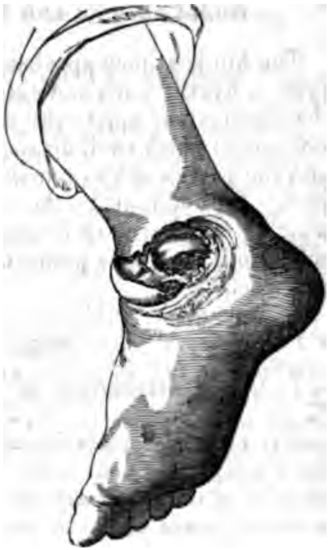
If the luxation have been complete, and remain unreduced, tension of the integument will be such as to render sloughing inevitable at the tense part; and the case so becomes compound. Then, three modes of procedure are open to the surgeon: to retain the parts as they are, and endeavor to bring them through the risks of open suppuration; to perform amputation at the ankle; or to excise the displaced bone, and hope to save both the limb and the joint. The last is usually to be preferred. Primary amputation is unnecessarily severe; and the first mode is declared by experience to be hopeless of a successful issue. When, therefore, the case is from the first compound, when it ultimately becomes so by sloughing or ulceration of the strained and bruised integument, and also when the circumstances are such as to render it plain that sloughing or ulceration must soon occur—the luxated bone is to be removed by incision, the limb is to be carefully adjusted, retention is to be maintained by the adaptation of suitable splints, and the case is then to be treated as a compound dislocation of the ankle-joint. In partial displacement, no such severity is ever necessary; in complete luxation, it may not be required; but in a luxation which is both compound and complete, and in complete luxation which is certain to become compound, such treatment is certainly preferable to the greater severity of immediate amputation—as well as to the perils of profuse suppuration, constitutional suffering, and the almost certain prospect of secondary amputation, which must follow an attempt to retain the bone.

2. The astragalus may be dislocated *Backwards;* becoming firmly wedged between the tendo Achillis and the posterior surface of the tibia. The bone is readily felt in its unnatural site; it is seen protuberant there; and the end of the tibia is felt projecting in front. Reduction, for obvious reasons, must be difficult. In only one case, probably, has the attempt ever proved successful, without chloroform—one which occurred to Mr. Liston.[1]

3. The astragalus has been displaced *Upwards;* wedged between the tibia and fibula. But this accident is extremely rare.

4. Dislocation has taken place *Outwards;* and it has also taken place *Inwards.* Such injuries are usually not only compound, but also complicated with fracture of one or other malleolus. They may be so severe as to demand immediate amputation at the ankle; or they may

Fig. 329.



Compound dislocation of the Astragalus. (Sir A. Cooper.)

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[1] Lancet, July 6, 1839.

admit of replacement of the limb, in the hope of saving it, after th
located bone has been removed.

II. *The Os Calcis and Astragalus* may be separated from the
bones of the Tarsus; the foot becoming displaced inwards, as in T
Varus. Reduction and retention are easy; the former by extensio
coaptation; the latter by placing the limb on the double-inclined
and securing the foot firmly on the foot-board.

III. *The Cuneiform Bones* may sustain displacement. Of the
internal is most likely to suffer. The bone projects inwards, and i
drawn upwards by the action of the tibialis anticus. Reduction
difficult. But, after a time, the limb may become little less usefu
before, even though the displacement remain unreduced.

Dislocation of the Metatarsus.

One or more of the metatarsal bones may be displaced upwa
the front of the tarsus; the foot having undergone a severe wren
by a fall from horseback while the foot is retained in the stirrup.
chloroform, the parts are easily reduced, and no retentive mea
necessary. Leeching, with other antiphlogistics, will probably
quired, however; such displacement not being likely to occur w
the infliction of much violence.

Dislocation of the Toes.

Luxation of the phalanges of the toes is rare. Reduction is r
effected by extension and coaptation. Compound luxations usua
quire amputation.

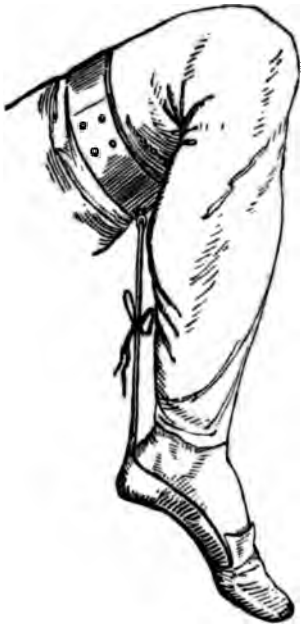
SUBLUXATIONS AND SPRAINS OF THE LOWER EXTREMITY.

The hip is seldom sprained. The knee suffers not unfrequently.
twist is usually such as to strain the inner aspect of the joint, and
the ligamentous apparatus may partially give way. Pain is grea
sickening; much swelling ensues, perhaps involving the synovial ca
and the part is apt to remain weak, and prone to recurrence of t
jury. In addition to the ordinary treatment suitable for sprai
wearing of a knee-cap is essential for some time, until the part, b
solidation, regain its power of resisting the more ordinary applic
of force.

Sprains of the ankle are extremely common; by twisting the fo
a fall, or by a "false step." The most ordinary sprain is caus
twisting the foot inwards; and the consequent pain and swelling
the outside of the foot—often great over the belly of the short ex
of the toes. Treatment is by rest, fomentation, leeching, &c. A
elastic bandage on the ankle is necessary, for some time, after w
has been resumed.

INJURIES OF THE TENDO ACHILLIS AND GASTROCNEMIUS MUSCLE.

Fig. 330.



Outline of limb, showing the slipper and ligature useful for maintaining flexion in ruptured tendo Achillis.

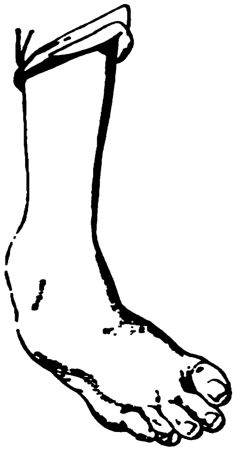
Rupture of the Tendo Achillis.—By sudden and violent exertion of the sural muscles, as in leaping, dancing, or running—more especially if the patient be muscular, advanced in years, and unaccustomed to such exercise—the tendo Achillis is apt to give way, close to or at its insertion into the calcaneum. There is immediate lameness; the patient falls, and is quite unable to resume the ordinary erect posture; much pain is complained of in the part; and, on manipulation, a very palpable gap is found at the site of injury. Usually there is, at the time of rupture, a sensation of something having given way; sometimes there is an audible snap; not unfrequently the patient complains of having been struck at the injured part, although no blow has been sustained there. Treatment is simple. Position, alone, suffices for replacement. The leg is bent, and the foot is extended, so as to relax the sural muscles completely, and favor approximation. This position is maintained by simple means. A slipper is placed on the foot; to the heel of the slipper a stout cord or tape is attached, and this is fastened to the thigh, by means of a circular belt applied there—or to the loins, in a like manner—as tightly as is necessary for securing the requisite degree of flexion. Bending may be voluntarily increased by the patient; and this does no harm. But extension is absolutely prevented. Reparation is slow; and the period of confinement requires to be extended, a week or two, beyond that required in the case of fracture. After consolidation, extension is made gradually, lest the uniting medium be over-extended, and disruption of it ensue. The patient, when first allowed to move about, with a crutch or stick, is provided with a high-heeled shoe, and every day or two a thin slice is cut from his heel, so as to permit a gradual approach of the sole to full planting on the ground.

Wound of the Tendon is managed in a similar way. Accidental wounds—as by a scythe, knife, or reaping-hook—are usually compound. And, in them, the cure may be facilitated by approximating the two portions of tendon by means of suture.

Ununited Tendon.—Cases sometimes present themselves, in which rupture of this tendon has not been repaired. The retracted portion has become rounded off; the calcaneous portion is similarly changed; and the space between is occupied by dense deposit, quite inefficient for restoring function to the muscles. The hiatus being considerable—perhaps to the extent of two inches, or more—the limb is quite useless

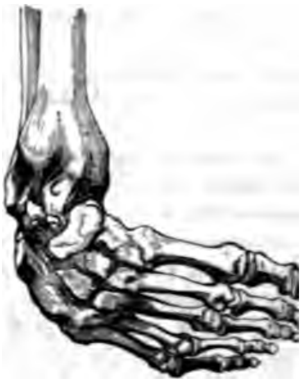
I. *Talipes Equinus.*—The muscles of the calf are contracted; tendo Achillis is rigid; the patient steps on the toes, without brin the heel to the ground; the foot is in other respects well-formed; the extensor tendons being on the stretch, there is a turning up o toes, independently of that which is caused by pressure in progre

Fig. 333.



Talipes varus.

Fig. 334.



The same dissected; showing the altered relative of the bones.

II. *Talipes Varus.*—This is the most common variety; consisti extension, adduction, and rotation of the foot—the rotation being logous to supination of the hand. The muscles of the calf and th ductors of the foot are contracted; the heel is drawn up; the toes inwards; the outer edge of the foot rests on the grouud; and, in gression, weight is borne on the outside of the foot and on the ankle—where adventitious bursæ usually form, of some size. Th are extended, as in the former case.

III. *Talipes Valgus* is the reverse of the preceding. There a duction, rotation, and partial flexion of the foot; the rotation l analogous to pronation of the hand. The front of the foot is r from the ground; and the patient rests on the inside of the instep on the inner ankle. The tendons of the peronei muscles are chie blame.

IV. *Talipes Calcaneus.*—The muscles in front of the leg are tracted; the foot is extremely flexed; and, in progression, the heel touches the ground.

One foot, or both, may be affected by Talipes. In the former the affected limb is found thinner and more flabby than the other; sometimes, by arrest of development, it is shortened as well as The mode of progression is painful and imperfect. And, not unfreque contraction takes place at the knee, to a greater or less extent.

Spurious Talipes is said to occur, when displacement of the foot t place by muscular change or integumental contraction, following on b extensive suppurations, ulcers, &c.

Treatment of Talipes.

In the minor cases, which occur in children, mechanical means—early employed, skilfully adapted, and duly persevered with—are alone sufficient to effect a normal relation of parts. Many such cases occur; and it is quite unnecessary to subject the little patients to the pain of tenotomy.

When the deformity obviously depends on a paralytic condition of certain muscles—as is more likely to be the case in the acquired than in the congenital examples—attempts may be made to obviate this condition, by remedies directed both to the system and to the part. Attending to the nervous centres, to the chylopoietic viscera, and to the general functions—we may find the symptoms yield, as in the analogous affection of strabismus. And the local means most likely to be of service are, blistering, the endermic use of strychnine, galvanism, exercise, friction, and passive motion.

Tenotomy is had recourse to, when structural shortening of muscle, of tendon, or of both, has occurred; and when the obstacles to replacement cannot otherwise be overcome. A large number of cases are so circumstanced. The operations, however, are but part of the remedial means; and will certainly fail, unless suitable apparatus be afterwards employed, well and sedulously. Instead of waiting for reunion of the tendons, and then extending their new bond of union, painfully and slowly, it is better to effect the required change of relative position immediately after section; leaving the interspace to be filled up by new matter. In the congenital form, the operation may be had recourse to about the twelfth or fourteenth month, when the patient is just beginning to walk; the mechanical and general remedial means having been in use previously. Extreme cases in the elderly adult should be regarded as irremediable. Tenotomy will fail to effect a cure; and may do harm, for a time at least, by impairing very seriously the acquired usefulness of the limbs.

In Talipes Equinus, division of the tendo Achillis is usually sufficient. In Talipes Varus, division of this tendon may suffice, along with the use of mechanical aid. But, very frequently, it is necessary also to divide the tibialis posticus and flexor longus pollicis. In confirmed cases, the tibialis anticus, and extensor proprius pollicis must be added to the list. In Talipes Valgus, the peronei are divided along with the tendo Achillis. In Talipes Calcaneus, the tibialis anticus is cut, along with the extensors of the toes.

The tendo Achillis is divided a little above its insertion into the calcaneum. The patient having been placed in a prone position, the limb having been steadied, and the foot having been bent, a tenotomy knife or needle is introduced obliquely; and, by bringing its edge or point on the rigid tendon, the fibres are cut from without inwards; an assistant flexing the foot forcibly, so as to assist in the disruption. This having been completed, the instrument is withdrawn, and a compress is applied to the aperture. Or division may be reversed; from within outwards; but there is thus a risk of accidentally wounding the integument. The tibialis posticus may be divided, either above the ankle, or near its insertion in the navicular bone; in general, the former site is to be pre The tibialis anticus is divided in front of the ankle; from belo wards, so as to save the joint. The flexor longus pollicis is divided felt tense in the sole of the foot. Sometimes it is expedient to the plantar fascia also; from below outwards, to save the importa tures beneath. The peroneus longus and peroneus brevis may be above the external malleolus, or near their points of insertion;—th at such points as circumstances may render apparently the most su As a general rule, in such operations, the knife is moved away fr towards, arteries and nerves.

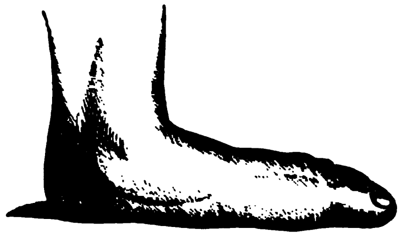
It is not improbable that, occasionally, reunion of the divided does not take place; but that a new attachment is formed. Obv section of tendon should be avoided within thecæ; as, in such a lo there is but little capability of the expected plastic exudation.

The mechanical apparatus need not be described. Many va are in use; the simplest usually the best. For the Talipes E and the Talipes Varus—the two most common varieties—the indi are simple, and may be simply executed; flexion of the foot, by on the ankle; and restoration of the normal position of the f regards rotation and abduction, by acting on the foot itself.

Flat-foot.

Young adolescents, of delicate health, and exposed to consid exertion on the feet, are liable to serious lameness from sinking arch of the tarsus; apparently in consequence of relaxation of th necting ligaments. The arch of the foot is lost, the tibia projects in the foot turns out, the ankle is apt to swell, and progression is awkward, difficult, and painful. The deformity affects both sexe all classes; excited, in the poor, by overwork; in the rich, by eversion of the feet, and overtasking of the limbs, in attempts to i polite accomplishments to organs. In most cases, a s system very similar to the mous will be found. By d tinuance of the exciting caus friction, by bandaging an wearing of a roborant plast the part, and by general treatment, relief is obtained. well also to have the sole shoe or boot, considerably t on the inner than on the oute And, if matters do not advance favorably, an apparatus may be which will both support the angle and invert the foot. Sometime young patient, in the process of further development, recovers symmetry and usefulness.

Fig. 335.



Flat-foot.

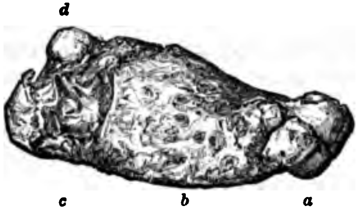
In confirmed cases, both deformity and lameness are great. peronei and anterior muscles of the foot obtain a preponderanc eversion of the foot becomes ultimately as considerable as in true T

Valgus. The preponderating muscles undergo structural shortening; the outer margin of the foot, and even sometimes the front of the foot generally, is raised from the ground; and locomotion is effected to a considerable extent on the heel. The gastrocnemii then waste, and the gait becomes very unsightly." Such cases are to be treated as examples of Talipes. Tenotomy is required, with the subsequent use of rectifying apparatus. And the tendons which require division are, the tibialis anticus, all the peronei, the extensor proprius pollicis, and the extensor longus digitorum.

Podelkoma.

This has been elsewhere described, as a form of multiple ulceration peculiar to the foot. By others it has been noticed as *morbus tuberculosus pedis.*[1] The milder forms may be remedied by pressure and constitutional alteratives; the advanced cases generally result in amputation.

Fig. 336.



Podelkoma; or morbus tuberculosus pedis. *a*, The toes, much altered; *b*, the outer side of the foot, in some parts showing cicatrices; *c*, the line of amputation, at the ankle; *d*, the astragalus. The swelling is often much greater than here represented.

Corns and Bunions.

These painful affections are the result of pressure, exerted by ill-constructed shoes and boots. They are more easily prevented than cured. 1. The shoe or boot should be large enough to contain the foot easily; and an allowance should be made for the occasional swelling to which the part is liable by exercise, heat, and a dependent position. 2. The sole should be at least as broad as that of the foot. The outline of the foot—represented on a piece of paper, on which the patient leans in the erect posture—should be the measure of the sole of the boot or shoe. 3. The boot or shoe should be square, or, rather, rounded in front; not sharp, with the point nearly in a central position. The point corresponding to the end of the great toe should be nearly in a line with the inside of the instep. And abundance of room should be given for each toe to occupy its own place, without any crowding, or overlaying of its fellows.

Corns consist of two parts. A thickening of the cuticle; and a hypertrophied and irritable condition of the corresponding papillæ of the true skin. The inflammatory process may supervene. And then a small abscess may form; very painful, because the matter is confined by the dense cuticle; and frequently leading to smart erythema or erysipelas of the foot. Corns are also said to be Soft and Hard. The foı situate on the outer points; the latter placed between the toes, w there is naturally considerable moisture. Another division of cor into the Laminated and Fibrous. In the former, hypertrophied cu is arranged in a laminated form; and there is uniform enlargemeı the papillæ beneath. In the fibrous, the central papillæ are mucl larged and project; each is surrounded by a sheath of epidermis; consequently, while the circumference of the corn is laminated central portion presents a fibrous appearance. And, in ordinary guage, these projecting papillæ are termed the "roots of the corn.'

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[1] Godfrey, Lancet, No. 1187, p. 593.

The indications of cure are simple. 1. To remove the cause wearing suitable boots and shoes, or by leaving the part altogethe fettered for a time. 2. By careful dissection, to remove the hard and hypertrophied cuticle; and, by repetition, to prevent reproduc 3. To remove the irritability, and to restore a normal state of the vera; by occasional application of the nitrate of silver. 4. If inflaı tion have occurred, poulticing, fomentation, and rest are suitable. the subsequently open state of the parts is taken advantage of, so tl free and effectual use of the nitrate may be made. 5. Inveterate are palliated, by wearing roomy and soft shoes and boots; also pro ing the corns, by means of thick plaster, which are excavated opp the tender points. And into the excavations, it may be well to in occasionally, extract of belladoma, or some other anodyne substanc

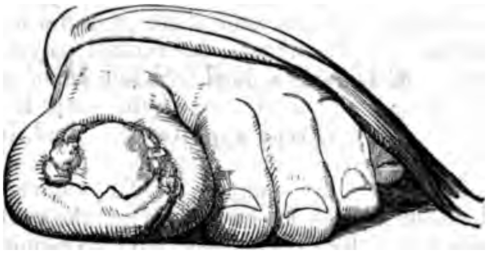
Bunions are formed thus:—1. Inordinate pressure has been ha ally made, by boot or shoe, on the ball of the great toe. The skin sequently becomes congested and tender; and the part is red swollen. This is one form of the affection; remediable by abstra of the cause, by rest and fomentation, and by a subsequent light u the nitrate of silver, or of a solution of iodine. 2. Or an adventi bursa forms over the joint; and enlarges gradually. Occasionall may show an unusual size, by reason of bursitis. The remedies foı form are—abstraction of the cause, discutient applications in the ch stage, antiphlogistics in the acute. A thin caoutchouc envelope is s times of service, by equalizing the pressure of the shoe. 3. Or, in sequence of repeated attacks of bursitis, the cyst suppurates, and o externally; the aperture becomes fistulous; the cyst contracts, but tinues to discharge fluid, more or less; and acute accessions are liable to occur. In this case it is necessary to destroy the cyst, b serting a piece of potass into the cavity. Afterwards, the granul sore is brought to heal under the ordinary means—rest, and simpl plications. 4. There is an aggravated class of cases, in which the enlargement of the osseous texture. Blistering and rest may make favorable impression. By suitable adjustment of the shoe, palliati obtained. 5. The joint may be partially displaced—in the rheun and gouty adults; the toe riding over its fellows, and pointing to outer side of the foot. This, too, can be but palliated.

Onyxis and Onychia; Exostosis; and Contraction of the Toe

Onyxis and Onychia require the same treatment, as when affec the fingers. The great toe is the especial site of Onyxis.

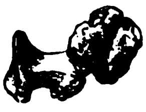
Exostosis of the Distal Phalanx of the Great Toe is a troublesome affection, not unfrequent in occurrence. Sometimes the growth takes place from the plantar aspect of the phalanx; but much more frequently from the dorsal; elevating the nail, causing pain, and seriously interfering with progression. Excision is performed, by means of a strong knife, or by cutting pliers; and, should any reproduction threaten, during cure of the remaining wound, the chloride of zinc is applied. Should excision fail, amputation of the phalanx is had recourse to.

Fig. 337.



Onyxis; affecting the great toe.

Fig. 338.



Exostosis of distal phalanx of great toe.

Contraction of the Toes.—The toes—more especially the one next to the great toe—are liable to extreme contraction, whereby considerable deformity is produced, the wearing of boots and shoes is rendered painful, and the functions of the foot are interfered with. Subcutaneous section of the extensor tendon usually permits sufficient restoration of the normal position. But it is not uncommon to find amputation of the offending too expedient; other means having proved unavailing, and the patient being himself anxious for a summary procedure.

Little, on the Nature and Cure of Clubfoot, &c. London, 1839. Tamplin, Nature and Treatment of Deformities, London, 1846. Bishop, Lectures in the Lancet, 1846. Weis, de Tenotomia Talipedibus applicata, Havniæ, 1844. Durlacher on Corns, Bunions, &c. London, 1845.

CHAPTER XLII.

AMPUTATION.

MUTILATION by removal of a limb, or part of a limb, is the la
source of our art; and ought never to be had recourse to, until it i
dent that other means either have proved, or must prove, unava
The profession have reason to rejoice that necessities for the perfor
of amputation are much less frequent than in former times; yet th
cumstances are not few—and in all human probability never will b
—in which nothing but the sacrifice of a part of the body will suffic
the retaining of existence. We are constrained to amputate: in sp
ing gangrene, as speedily as possible, if there be a sound space in
to make our incisions; in chronic gangrene, when the line of separ
has been formed, and is advanced; in tumors which are of a malig
kind, and involve a bone or joint; in diseases of the joints, which
baffled our skill, and have caused urgent hectic; in cases of recen
jury, when it is evident that the parts are so far mutilated as to r
recovery impossible; and in cases of attempted preservation of l
after injury, when it is plain that further continuance of the att
must be attended with unwarrantable peril of life. Not unfreque
also, a partially recovered limb proves so stiff, useless, and inconven
as to urge the possessor to seek its removal; and such operatio
"*complaisance*" are not always to be declined.

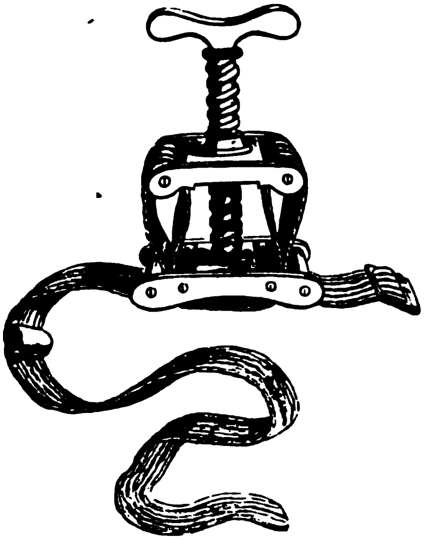
In the case of injury, amputation is either primary or secondary
former, when done immediately, after the system has emerged fro
state of shock, and before it has become involved in febrile excite
the latter, when performed after febrile accession has occurred,
when—it may be after some weeks—life is threatened by excessive
puration, disease of bone, disease of joints, or sloughing of the
parts. The comparative merit of primary and secondary amputati
still, with some, a disputed point. The question has already been
sidered. For its decision, a mere comparison of statistical deta
obviously insufficient; for, in one class are necessarily included all
most severe cases, while the other contains many of a very minor
racter.

The two chief objections to the primary operations are:—1.
shocks may overpower a patient, who might have rallied success
from one. To this it is answered, that the operator must choos
time skilfully; not bringing the two shocks into immediate contact;
waiting until the former has wholly passed away; and not operati
all, unless a sufficient rally shall have taken place. It is seldom th
patient perishes of mere sinking, after amputation. And besides

the use of chloroform—an agent which is seldom dispensed with in amputations nowadays—it is to be remembered that the shock is very much modified, and a positive tolerance of the operation seems to be imparted to the system. 2. It is alleged that a robust state of body—in which the patient may be, at the time of the accident—is less favorable to recovery than the comparatively reduced state which obtains after subsidence of the inflammatory fever. This objection obviously can be removed, by judicious antiphlogistic treatment of the case. Not unfrequently, inflammatory fever, and its results, afford no opportunity to judge of the expected favorable condition for secondary operation; the patient dying during the inflammatory period.

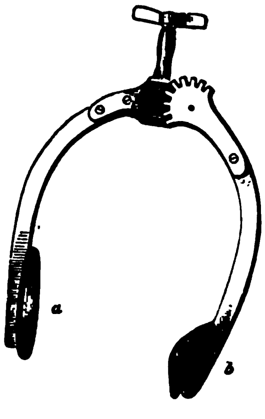
But we would rather refrain from the discussion in this place; and would simply repeat the practical rule, on which the great majority of surgeons are agreed,—That, when an injury has been sustained by a limb, of such a character as to render it impossible, in the opinion of the surgeon, that the part can be retained; when, in other words, it is obvious that amputation must be performed at some period of the cure—it is better to amputate at once, so soon as the system has rallied from the primary shock; preferring to encounter the minor risk by rapid succession of a second shock, rather than to meet the more perilous invasion of intense inflammation, with its serious consequences to both part and system.

Fig. 339.



The Tourniquet unapplied; but with its two platforms as much separated, as if in actual use.

Fig. 340.

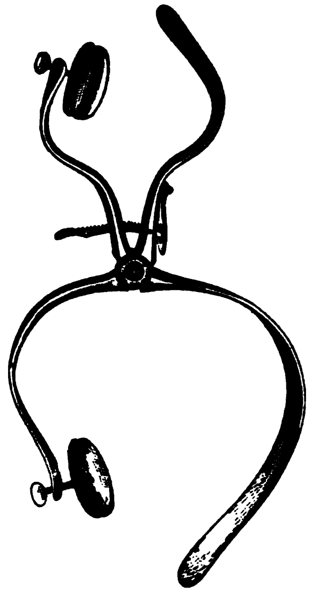


Signoroni's Compressor. *a*, The point of counter-pressure. *b*, The pad which acts directly on the vessel.

Another question, scarcely yet arranged, is as to the comparative merits of the old circular method of operation, and of the modern operation by flaps. In this part of the country the latter is tacitly preferred; recourse to the circular method being quite the exception to the general

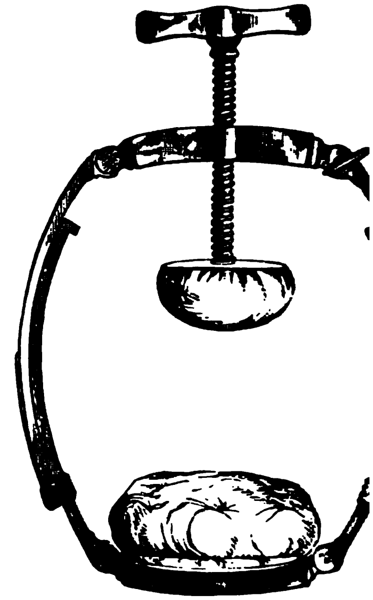
rule of operating. And the obvious advantages are; more rapid
formance; a cleaner cut; a better covering to the end of the bone

Fig. 341.



[Gross's Arterial Compressor. for the upper and lower extremity. (From the N. A. Med. Chir. Rev. for Jan. 1857.)]

Fig. 342.



[Mr. Skey's Tourniquet.]

a power of selection, as to what parts shall constitute the cov
The vessels are cut obliquely, no doubt; but, if the ligatures be a
carefully—as they always ought to be—there is no risk of seco
bleeding on this account.

In temporarily restraining hemorrhage, during the incision
hands of an assistant are usually preferable to any tourniquet;
already been explained. And pressure is not applied until the kni
begun to penetrate; in order that no unnecessary loss of blood m
occasioned, by venous congestion beneath the site of compression.

In the Flap operation, the following are the more important poi
detail. The patient is arranged comfortably recumbent, on a firm
of convenient height for the operator; who places himself on the
the patient, so that his right hand may be used, freely, for the inc
The sound limb is held steady, and out of the way, by an assista
is secured by a towel—in the case of the lower limbs—to a leg
table. Ordinary assistants are ready to control the motions
patient, to reassure him, if need be, and to minister to his wants.
experienced administrator undertakes the whole charge of the chlor
from the beginning to the end of the operation; never allowing h
to be distracted by the details of this from a close and uninter
watching of the patient. A trustworthy assistant is ready to con
the hemorrhage, by the pressure of his own fingers, or by that of a

niquet. Another is prepared to retract the flaps, and to tie the arteries. A third is stationed to hand what things may be required; and these are suitably arranged on an adjoining table—tourniquet, bandage, lint, ligatures, sutures, knives, saw, cutting-pliers, artery-forceps, sponges—chloroform. If necessary, an assistant, seated in front of the patient, steadies and supports the limb to be removed.

Suppose that the thigh is to be amputated by double flaps. The surgeon grasps the flesh in front of the limb with his left hand, so as to raise it from the bone; thereby facilitating the making of a full flap anteriorly. As the knife's point is about to enter, pressure is applied to the femoral. Transfixion is made, by pushing the knife down to the centre of the bone, horizontally; gently passing the point round the bone to the front; then pushing across, so as to make the point of exit as nearly as possible opposite to that of entrance. Moving the knife downwards and outwards, with a gentle sawing motion, a sufficient flap is formed anteriorly, and this is retracted by the assistant; or, rather, is simply elevated. The knife's point is then re-entered, about an inch beneath the site of former transfixion; in order to avoid cross-cutting of the integument, which is otherwise apt to occur. And, the second transfixion having been effected, a second flap is formed posteriorly. This is quickly laid hold of by the assistant's other hand; and he now retracts both flaps; pulling steadily; and keeping his own fingers out of the way. The surgeon, by circular sweeps of his knife, divides the soft parts completely, as high as the fleshy commissure of the flaps will permit; effecting this leisurely and coolly, in order that it may be done thoroughly. Not even a shred of periosteum should be left at the point which is to be sawn; and this should be as close to the adherent cushion of muscle above, as the instrument can be made to go. The form of the

Fig. 343.

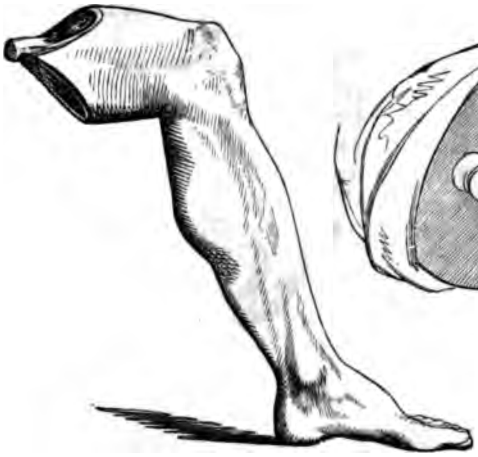


Fig. 344.

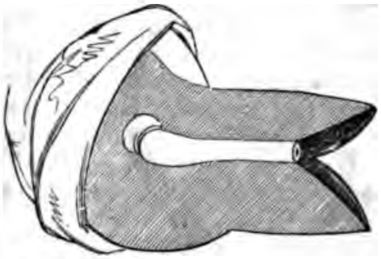


Fig. 343. The flap operation, illustrated in the thigh. The sloping wounds, whence the flaps have been taken, shown in the amputated part.

Fig. 344. The corresponding stump; intended to exhibit the comparatively small extent of wound that remains; in contradistinction to Fig. 346.

wound—the flaps unretracted—is conical; and the sawn end of th
must occupy the very apex of the cone.

The assistant continuing to keep the flaps out of harm's w
saw is applied to the isolated portion of bone—the side of the
ment lying close upon the fleshy wall above. The saw is held p
dicularly, and is "grooved" by drawing it lightly from heel to
By steady sweeps, section is effected; the surgeon, meanwhile, c
ling the lower limb with his left hand; making sure that it is n
too high, so as to lock the saw by shutting it up in its own groov
taking equal care to prevent its being too much depressed, so as t
splintering of the bone when the section is nearly completed. I
and after the use of the saw, the assistant takes care to apply n
tion to the flaps, lest the periosteum be unnecessarily stripped up
Should this happen to any considerable extent, necrosis and exf
may scarcely fail to ensue. Should any roughness remain on t
of the bone, either by splintering or from natural construction, th
be removed by means of the cutting-pliers.

Attention is now immediately directed to the arteries; the
being the first secured. Each is laid hold of with the artery-f
and, by being pulled outwards, is separated from all surroundin
tures; partly to insure deligation of the arterial coats only; pa
secure application of the ligature beyond the oblique section of the
By neglect of this, nerve and vein may be unnecessarily injured
the ligature's noose, traversing the oblique section, not going bey
may leave a part of the arterial mouth still open, and ready to af
troublesome hemorrhage. So soon as the larger arteries have
secured, the assistant relaxes his pressure above, or altogether re
it. The smaller vessels can be quite commanded by the finger p
and, were the high pressure continued, venous loss of blood must
sarily ensue. Removal of the pressure above is usually suffici
arrest the venous flow. But should this continue, direct press
made, either by the finger applied to the venous orifices, or by sh
the flaps and pressing them firmly together for a short time. Deli
of a vein is unwarrantable.

Bleeding having been satisfactorily arrested, the flaps are pa
approximated by a few stitches; and, a wet cloth having been app
the line of wound, the patient is removed to bed. The subsequent
ment is conducted according to general principles; our object u
being to obtain adhesion, yet not unfrequently preferring a mo
suppuration—as when the system has been long previously subjec
copious discharge, the sudden arrest of which might seriously en
the internal organs.

The *Circular amputation* is performed thus—again supposi
thigh to be the part concerned. An assistant, grasping the lim
both his hands, draws up the skin as far as possible. The surgeon
ing the knife lightly, and with his arm at first placed under the
divides the skin and areolar tissue in one continuous sweep. The
ant now retracts the skin more decidedly than before; and he is a
in this by the surgeon touching the subcutaneous tissues at various
with the knife. Close to the retracted integument, the knife is

laid on; and, by a second sweep, the superficial muscles are divided. These are pulled upwards by a retractor—a portion of linen or leather, slit at one end; and, by a third sweep of the knife, laid on close to the retractor, the bone is made bare. Retraction is then applied to all the fleshy textures—touches of the knife assisting to expose the bone at a higher point; and this having been reached, complete isolation of the bone is effected there. The saw is applied, while by the retractor the muscles are protected from injury. Bleeding having been arrested, the soft parts are let down, and are arranged so as to make the line of wound rectilinear.

Fig. 345.

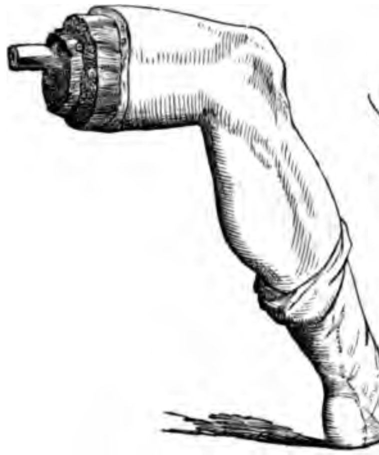


Fig. 346.

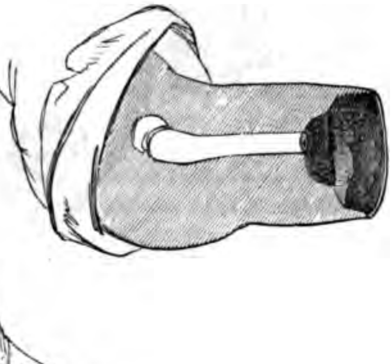


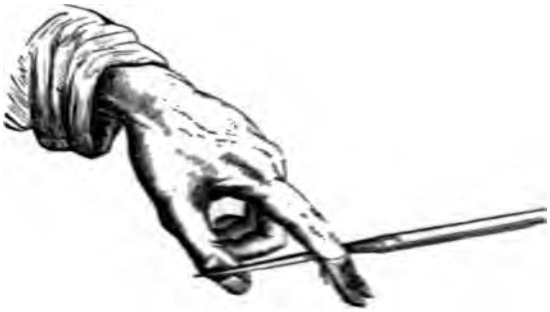
Fig. 345. Circular amputation, illustrated in the thigh. The terraced arrangement of the wound shown in the amputated part.

Fig. 346. The corresponding stump; intended to exhibit the comparatively large extent of wound that remains; in contradistinction to Fig. 344.

Amputation of the Fingers.

Amputation at the Distal and Middle Joints is performed thus. An assistant controls bleeding by grasping the wrist tightly. Another separates the fingers from that which is doomed, at the same time steadying the hand in a pronated position. The surgeon lays hold of the finger, slightly bending the joint at which removal is to take place; and the articulation is then laid open, by a sweep of a narrow straight bistoury. Division of the lateral ligaments is completed, if need be, by the point of the instrument; and the joint is more flexed, to favor disarticulation. This having been effected, the knife's blade is placed behind the head of the bone; and by cutting downwards and outwards, a sufficient flap is formed on the palmar aspect. Previously to disarticulation, the surgeon lays hold of the part on its dorsal and palmar aspects; in making the flap, his hold is lateral. Or the procedure may be reversed. The hand being placed in a state of supination, transfixion is made in front of the joint; by cutting downwards and outwards, the flap is made in the first instance; and then, by a sweep of the knife, disarticulation is effected, and the integuments on the dorsal aspect are divided. no hemostatics are required. The flap is turned over the joi

Fig. 347.



Amputation of the finger at the distal articulation.

retained in its place by a single point of suture, or by bandag alone.

The Proximal phalanx, if not wholly involved in injury need not be entirely sacrificed. Amputation may be perf the middle of the bone; in obedience to the general rule, of much as possible of the organ of prehension. A stump of the is especially useful. By transfixion on the palmar aspect, is formed there; and a small semilunar flap of integument the dorsal aspect by a subsequent sweep of the knife. Or ing flaps may be made on the sides of the finger; in cases injury, when the palmar aspect is much mutilated. The been made bare at the upper part of the wound, is severed pliers. And in using this instrument care is taken to place side always where the stump is to be; otherwise splintering [illegible] are apt to occur. Hemorrhage having been arrested are united and retained in the ordinary way.

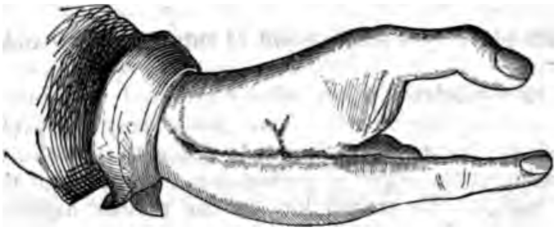
Amputation at the Metacarpal Joint may be performed in ways. The hand is held pronated. 1. The finger, well sepa its fellows, is laid hold of by the surgeon, and pushed to one the exposed and [illegible] the instrument is passed upwards [illegible] so as to expose that side of the articulation, [illegible] leaving on its other side a flap of suitable dimensions. With joint disarticulation is effected, the finger being pushed [illegible] facilitate the process. When the knife is used for this pu [illegible] wounding of the integument could not well be avoided. [illegible] the bone having been detached, the blade of the knife is [illegible] and by cutting [illegible] a second flap is [illegible] the former—while at the same time, detachment of [illegible] completed. 2. Or the knife's point is entered on the [illegible] knuckle; and by one continuous movement is carried round so as to make two [illegible] semilunar flaps at the [illegible] posing the joint. Disarticulation is then completed, and

moved. The digital arteries usually require ligature. Apprc
is effected by bringing the two adjoining fingers together, and
them so by means of a slip of bandage. Cold pledgets of lin
plied; and, otherwise, the wound is managed in the ordinary w

When operating on the fore and little fingers, it is well to e:
incisions a little upwards, to expose the head of the metacar]
and to remove its articulating surface by means of the cutti
The stump is more rounded, and has a more seemly appeara
cicatrization, than when the end of the metacarpal bone is lef
ing. But, in doing this, care must be taken not to injure the t
ligament.

Amputation of the Metacarpal Bones of the fingers is s
required; in consequence of disease affecting one or more of th
incisions vary, necessarily, according to the extent of the dis

Fig. 348.



Stump of the hand, in which the thumb and little finger, with their metacarpal bones, we
after amputation on account of injury by a printing machine. The thumb and finger acqui
bility and power, and the stump proved most serviceable.

the site of the openings already existing. Disarticulation fron
pus requires both skill and caution. The fingers are taken
metacarpal bones; for, the former become useless appendages,
prived of their support. If in amputating a finger and its m
bone, the corresponding carpal surface be found in a carious
the use of a gouge the diseased parts may be removed; and th
of cure may prove most satisfactory.

Disease or injury of three metacarpal bones, does not warran
of the whole hand. The stump which results from amputati
affected parts only, is infinitely more serviceable than that whi
complete mutilation.

When the lower part, only, of a metacarpal bone is affected,
lation at the carpus is not attempted; but section of the bon
in its shaft, by means of the cutting-pliers. The knife is enter
dorsal aspect, at the point where section is to be made, and i
down in the mesial line, till the knuckle is reached; there a d
is made, on either side, as in amputation of the finger only; bu
passing the knife so deeply as to open the articulation. The
section, the diseased portion of the bone is isolated; care being
leave the palm entire.

Also, when a single metacarpal bone is removed entire, it i

spare the palm; the hand being afterwards both more useful an
seemly than it otherwise would be.

Amputation of the Metacarpal Bone of the Little Finger is
plished thus: The finger is laid hold of, and separated from the
and the bistoury, laid on the stretched web, is carried up at once,
the inside of the metacarpal bone, to its articulation with the un
bone of the carpus. The doomed part being much pushed out
disarticulation is effected with the point of the knife. And th
blade having been placed behind the base of the bone, a suitable
formed on the outer side, by bringing the knife downwards and ou
—causing it to emerge a little below the metacarpal articulation.
morrhage having been arrested, the flap is accurately adjusted
raw metacarpal surface, and retained in the usual way.

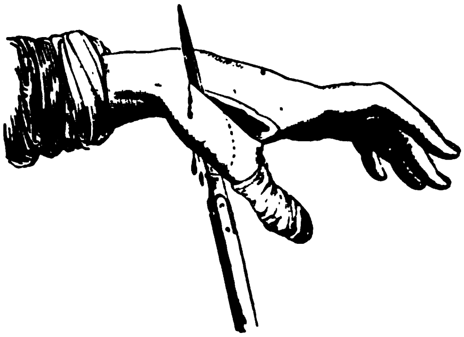
Or the flap may be made in the first instance; by transfixing
carpal articulation, and carrying the knife downwards and outwa
before; or, by marking out the flap with the knife's point, and dis
it up—cutting from without inwards. One obvious advantage
mode of operating is, that should the base of the metacarpal b
found not diseased, it may be saved; instead of disarticulation th
is cut across by the pliers.

Amputation of the Thumb.

The phalanges of the thumb are removed in the same way
phalanges of the fingers.

Amputation of the Phalanges, with the Metacarpal Bone,
effected in the same way as removal of the little finger and its meta
bone; by placing the bistoury on the web between the thumb an
finger, passing it up to the articulation with the trapezium, disart

Fig. 349.



Amputation of the thumb and its metacarpal bone.

ing there, and forming a suitable flap by bringing the knife down
opposite side of the bone. Or, by transfixing at the articulation
the trapezium, and making the flap in the first instance; after
effecting disarticulation, isolating the bone, and removing the me

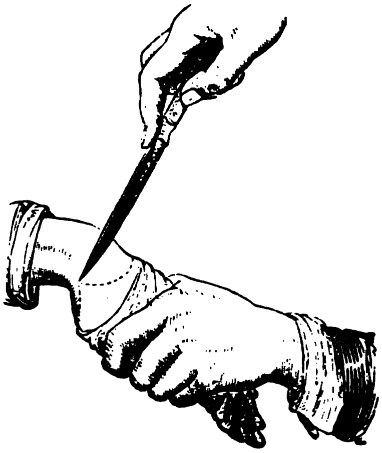
Or the flap may be made by dissection upwards. Or the bistoury may be entered over the trapezium, and carried down on the dorsum of the metacarpal bone; having reached the distal extremity of this bone, it may be swerved to the inside; thence it may be made to transfix the ball of the thumb, emerging where it first entered; and, by cutting outwards and downwards, the flap may be constructed.

Amputation of the Wrist.

Hitherto, pressure on the wrist has sufficed temporarily to restrain hemorrhage. Now, compression of the humeral is expedient; and is best effected by the firm and steady grasp of an assistant—on the lower part of the arm—the nerves being excluded from pressure as much as possible.

Hitherto, also, a narrow, straight, sharp-pointed bistoury has been the preferable instrument, for making the incisions. Now, a regular amputating knife is required. An exaggeration of the former instrument, in a fixed wooden handle; straight, sharp-pointed, and of fine edge and temper; light yet firm. The amputating case contains various sizes; proportioned to the dimensions of the parts which may require their use.

Fig. 350.



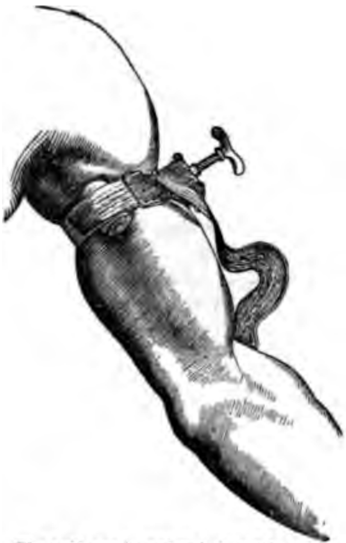
Amputation of the Wrist.

For the wrist, the shortest size will suffice; the blade not much larger than that of a full-sized bistoury. The arm is steadied, with the hand in a state of pronation. The knife is laid on below the styloid process furthest from the operator—who stands on the patient's left—and is carried across the limb so as to form a semilunar wound on the dorsal aspect, whose centre extends as far as the second carpal range, and whose termination is below the styloid process on the side next the surgeon. An assistant retracts the flap thus formed. The wrist is bent, and disarticulation effected. The blade of the knife is then laid behind the carpus; and, by cutting outwards and downwards, a suitable flap is formed on the palmar aspect. In the last part of the proceeding, the pisiform bone is to be avoided; and, in endeavoring to escape from it, care must be taken not to notch the corresponding portion of integument. The radial, ulnar, and interosseous arteries, require ligature.

Amputation of the Forearm.

Pressure being made on the humeral, the limb is steadied, with the hand in a state of pronation. Two flaps are formed; one on the dorsal,

Fig. 351.

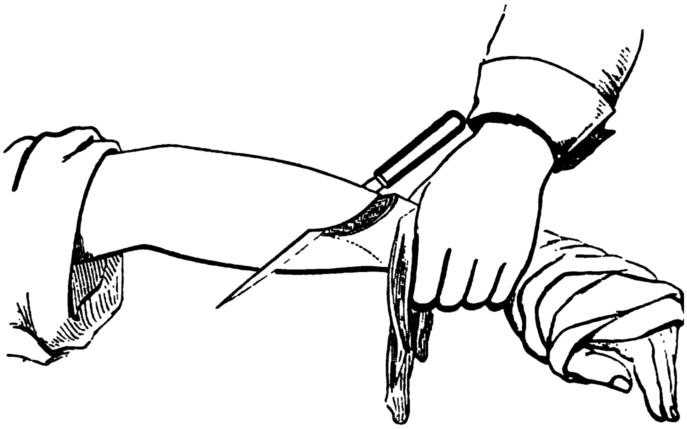


The ordinary tourniquet shown in application to the brachial artery: a bandage enacting the part of compress over the vessel—not very accurately placed.

the other on the palmar aspect.
the middle of the forearm, it is n
to obtain a sufficiency of fleshy c
Yet—when circumstances will at
mit—the general rule is not to b
deviated from; of removing as
possible from the organs of pre
And, besides, another practical
comes into play; namely, that
ther removed an amputation is f
trunk of the body, the less is th
life thereby.

The flaps may be made either b
fixion, or cutting from without i
The former mode is usually pr
In the case of the left forearm,
geon with his left hand pinches
cushion of flesh on the dorsal asp
enters his knife horizontally o
ulna, bringing it out at a corres
point over the radius. The k
again introduced, beneath the ul
pushed through on the palmar a
the bones; not at the same poin
former transfixion, but about half
lower down—a precaution which is to be attended to in all dou
amputations, as already stated. An assistant retracts the flaps;
few circular sweeps of the knife the surgeon clears the bone of sof
at the very upper part of the wound; the interosseous space is fr
the knife being passed between the bones; and the saw is then a
At least, the three principal vessels require ligature. The wound i
adjusted in the ordinary way.

Fig. 352.



Amputation of Forearm.

In transfixion, it is obvious that care must be taken to avoid passing the knife between the bones. On this account, the position of the limb here recommended is preferable to the middle state between pronation and supination; and during the incisions, care must be taken that the position is maintained unaltered.

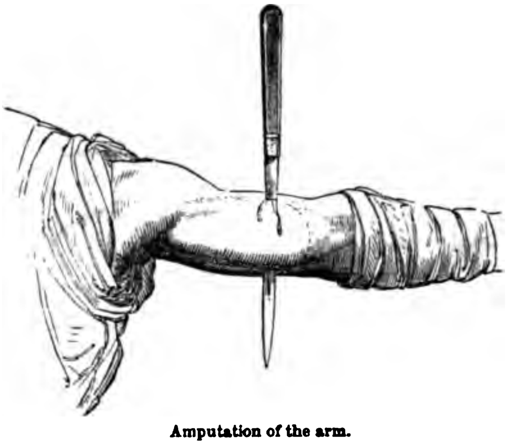
Amputation of the Elbow-Joint.

If space enough be left on the forearm, in extensive disease or injury of that part, the humerus need not be interfered with. An excellent operation may be done at the elbow; making a single flap in front. The limb is steadied, with the hand in a state of supination. Transfixion is made, by passing the knife over the condyles, in front of the joint, and, by cutting downwards and outwards, a large and suitable flap is constructed. With a circular sweep, the integuments behind are divided; and disarticulation is then effected. The olecranon may be sawn across; or, extending the forearm, this process may be wholly removed, the attachment of the triceps having been severed. The flap is then suitably adjusted over the trochlea of the humerus.

Amputation of the Arm.

Pressure is made on the upper part of the humeral, or in the axilla. The surgeon with his left hand steadies the limb, below the point of incision; an assistant, seated in front of the patient, supports the hand and forearm. The knife is entered horizontally over the bone near its centre, on the side of the limb nearest the surgeon; the point having touched the bone, is passed lightly round to its anterior surface, by depression of the handle; then the handle is raised again to its former level, and transfixion is completed. By cutting downwards and outwards, an anterior flap is formed. The knife is re-entered on the opposite aspect of the bone, a little lower down; and, after transfixion, is brought

Fig. 353.



Amputation of the arm.

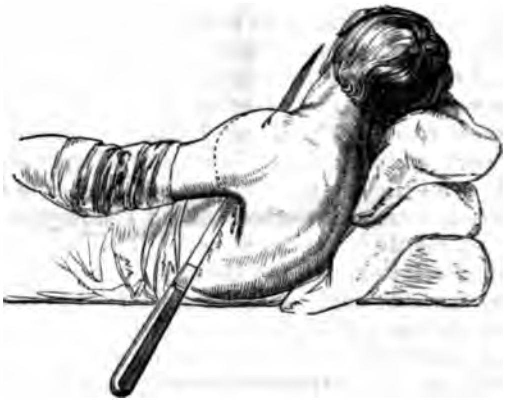
out so as to construct a corresponding flap posteriorly. The flaps
been retracted, the bone is bared, and the saw applied.

Amputation of the Shoulder-Joint.

Hemorrhage is restrained by pressure applied to the subclavia
the clavicle; by the fingers alone; or by means of the handle of
well padded; or by means of any other suitable compressing
The pressure is not made downwards merely; but downwards an
wards, so as to jam the vessel between the compressing agent
first rib. The patient may be either seated or recumbent. The
position is the more convenient for the operator, as well as for t
pressor; but, if it be adopted, it is necessary to secure the
against changing his position, through fainting or restlessness,
ing him to the back of the chair by means of a sheet or a towel,
as by a suitable arrangement of supporting assistants. And n
chloroform is almost invariably employed, this posture is g
superseded by that of recumbency. In cases of injury, the sele
flaps, as to position and form, may not be left to the surgeon's
but may have been already indicated by the nature of the a
When space and opportunity for selection are afforded, however,
ration may be accomplished in a variety of ways.

The method by transfixion, and by the formation of an outer a
flap, is so generally preferred and practised, that to it alone nee
tion be directed. The steps of the operation vary according to t
operated on. In the *right* shoulder, it is effected thus: A lon
is entered on the top of the shoulder, about an inch below the ac
and, passing round the joint, on its exterior, is brought out imm
within the posterior border of the axilla. By cutting outwa
downwards, a large outer flap is formed. The arm is then carrie
the chest; and the head of the bone, thus made prominent, is c
upon by a sweep of the knife. The capsule is opened, and dis

Fig. 354.



Amputation of the shoulder.

tion effected; and the blade of the knife, laid on the inside of the head of the bone, is carried rapidly inwards and downwards, so as to form an internal flap, considerably smaller than the other. The main artery is immediately secured by ligature; and then pressure on the subclavian is removed, lest, by its continuance, venous hemorrhage should be favored.

On the *left* side, the knife, having been entered within the margin of the posterior border of the axilla, is made to emerge on the top of the shoulder, a little beneath the acromion; and the outer flap is formed as before. The arm is then carried over the chest, disarticulation is effected, and another flap is formed. Or the outer flap may be marked out by a bistoury, and dissected up.

After cicatrization, the stump requires artificial protection; otherwise, the prominent acromion is apt to sustain injury.

Amputation of the Scapula.

Disease and injury sometimes, though rarely, render it necessary to take away the scapula along with the superior extremity. No fixed plan can be laid down for the incisions; they must vary according to the circumstances of the case. When such extensive mutilation is required on account of injury, the greater part of the incisions will probably be found already made.

AMPUTATIONS OF THE LOWER EXTREMITY.

Amputation of the Toes.

The *Phalanges* of the toes are removed in the same way as those of the fingers. The metatarsal articulation, however, lies considerably deeper than the corresponding joint of the superior extremity; and the incisions require to be made accordingly. There is no necessity for removing the head of the metatarsal bone; the more ample the base of support, the more efficient is its function.

The Metatarsal Bone of the Great Toe is not unfrequently diseased in the greater part of its extent. It may be disarticulated; but it is better to divide it a little below its base, if possible, in order to leave the tendinous insertion there undisturbed. By a bistoury, such a flap is indicated as will efficiently cover the wound. The instrument is entered over the tarsal articulation, on the dorsum of the bone, and is carried down, along the dorsum, until the metatarsal joint is reached; a sweep is then made on the inner side of this—or rather a little below the joint; and the incision is continued upwards, leaving an interspace of about an inch and a half between the returning line of wound and that which descended. The flap, thus indicated, is dissected up; the bone, along with the corresponding toe, is isolated from its connections, by a suitable use of the knife's point; and is either disarticulated, or cut across by the pliers, according to circumstances. After removal of the diseased part, and arrest of hemorrhage, the flap is brought down and adjusted to the raw surface.

The other Metatarsal Bones are liable to the same operations as the analogous bones of the superior extremity. A very useful foot m left, after removal of even three of the toes with their metatarsal b

In estimating the extent of incisions required, it is important t member the oblique direction of the metatarsal range.

Amputations of the Foot.

All the Toes may require removal at their metatarsal articulatio account of frost-bite. A transverse incision is made on the dorsal a sloping inwards, so as to make a short anterior flap. Disarticulat then effected, at each joint; and, the blade of the knife having bee behind the heads of the phalanges, a suitable flap is made from the tar aspect.

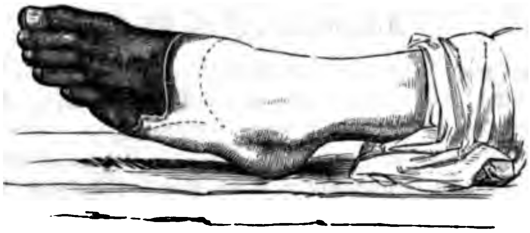
In the case of a more extensive disease or injury, similar flap be formed—the plantar being made by transfixion; and then the tarsal bones are divided by the bone-pliers.

Hey's Amputation.—The whole metatarsal range may be taken leaving the foot very useful. Hemorrhage is restrained by the pr of an assistant at the ankle—mainly exerted on the posterior The patient is laid recumbent on a table, with the foot projecting the edge. The surgeon, with his left hand, steadies and command toes. On the right foot, the prominence of the base of the meta bone of the little toe is felt for; the knife's edge, laid on immed above this, is carried across the dorsum of the foot in a semilunar tion, terminating at the articulation of the base of the metatarsal of the great toe with the internal cuneiform bone. The short an flap, thus indicated, is dissected up; and disarticulation is effect each joint; the surgeon pressing heavily downwards on the toe metatarsal range, so as to favor this, by rendering the joints more The peculiarity of the relative position of the base of the second tarsal bone has to be borne in mind; and the point of the knife, should be used for its detachment. Should anchylosis have taken there, the pliers or saw are to be employed; dividing the bone on with the general range of articulation. Disarticulation having effected, the blade of the knife is laid on behind, and a sufficient made from the sole of the foot—longer on the inner than on the aspect. Or the flap may be fashioned, and dissected up, probably accurately by cutting from without inwards. The bleeding vessel ing been secured, the flaps are adjusted by suture and strap.

In operating on the left foot, the dorsal incision is begun ov articulation of the metatarsal bone of the great toe with the in cuneiform bone, and terminates behind the prominent head of the tarsal bone of the little toe; in other respects, the operation is the

Chopart's Operation.—Amputation may be performed still hig leaving a useful stump. Disarticulation is effected between the galus and the navicular bones; all the bones of the foot and tarsus removed, except the astragalus and calcaneum. The operation is ducted on the same principles as the preceding; a short flap being in front, and the main flap being obtained from the sole of the foot. marks for laying on the knife in its dorsal sweep are, the articulati the navicular bone with the astragalus, behind the prominence of the navicular bone, in front of the inner ankle; and the articulation of the cuboid with the os calcis, about midway between the outer ankle and the prominent base of the metatarsal bone of the little toe. Often, however, these marks cannot be discerned on account of swelling.

Fig. 355.



Amputation of the foot.—Chopart's.

After cicatrization, the remnant of the foot is not displaced backwards, so as to bring the cicatrix in contact with the ground in walking, as might have been expected, from preponderating action of the muscles of the calf. The muscles on the front of the leg, forming new attachments, seem to counteract this effectually.

A third amputation of the foot—intermediate between the two preceding—may be performed, by disarticulating the cuneiform bones from the navicular, and sawing the cuboid bone across at a corresponding point. The general plan of the incisions is the same as in the two preceding cases.

Resection of the Ankle.

When disease is limited to the ankle-joint and upper part of the tarsus, it is a question whether or not excision of the diseased parts may not be performed, leaving the foot. On this principle, Mr. Wakley has removed the calcaneum and astragalus, at the same time sawing off the malleolar surfaces of the tibia and fibula.[1] Further experience of this operation, however, will probably be required, ere it be received as a substitute for that next described.

Amputation of the Ankle.

When no part of the foot and tarsus can be saved, amputation is required either in the leg or at the ankle. The latter site is preferable on more than one account: risk to life is less; the mutilation is less; and the stump is not only more useful in progression, but also less liable to neuralgia and exfoliation. Disease of the ankle-joint does not contraindicate the operation, unless it extend beyond the ends of the bones. And in most cases of diseased ankle, indeed, it were now unwarrantable to perform any other operation.

For the revival and more general introduction of this procedure, the profession is indebted to Mr. Syme.

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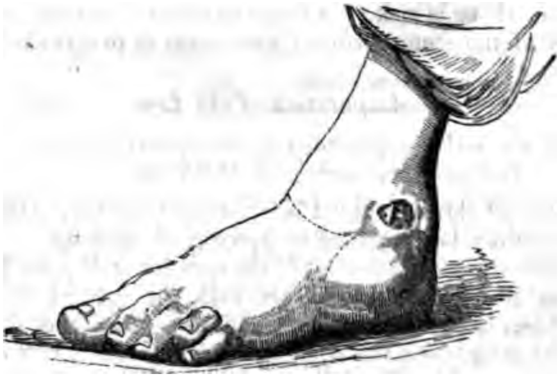
[1] Lancet, No. 1296, p. 5.

The patient having been suitably arranged on a table, a tourni applied, so as to compress the popliteal artery; or the fingers assistant may be employed, as in amputation of the foot. A sem incision, directed forwards, is made over the instep, with a stron toury or short amputating knife; and a corresponding wound is across the sole of the foot. "The foot being placed at a right

Fig. 356.



Amputation of the ankle.

to the leg, a line drawn from the centre of one malleolus to that other, directly across the sole of the foot, will show the proper ex the posterior flap. The knife should be entered close up to the malleolus, and carried to a point on the same level of the opposit which will be a little below the tibial malleolus. The anterior i should join the two points just mentioned at an angle of 45°, to t of the foot and long axis of the leg. In dissecting the posterio the operator should place the fingers of his left hand upon the heel the thumb rests upon the edge of the integuments, and then cut b the nail of the thumb and tuberosity of the os calcis, so as to lacerating the soft parts, which he, at the same time, gently but s presses back until he exposes and divides the tendo Achillis. T should be disarticulated before the malleolar projections are re which it is always proper to do, and which may be most easily e by passing a knife around the exposed extremities of the bones, an sawing off a thin slice of the tibia connecting the two processes.[1] most cases, the operation will be most readily conducted by com opening the joint from the front, before dissecting off the soft part the calcaneum. Bleeding having been arrested, the flaps are b together by suture; and care must be taken, during the cure, to p accumulation of pus in the pouch which may be formed by the po flap. After cicatrization, a most efficient, round, callous stump i duced; the patient resting on the integuments of the heel—well tomed to pressure—and retaining a full use of the knee and leg.

It has been said that division of the posterior tibial artery, be divides into its plantar branches, should be avoided; otherwise, partial sloughing of the flaps is apt to ensue. Usually, however, incision will not be found to interfere with the arterial trunk in question. And it is probable that in those cases in which sloughing has occurred the accident was not wholly attributable to deficiency of arterial supply.

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[1] Syme, Contributions to Surgery, p. 146; and Monthly Journal, Feb. 1850, p. 17

Should circumstances not be suitable to the plan of incision as above described, lateral flaps may be made—leaving the integument of the heel as much entire as possible. The operation may be readily effected in this way; but there is risk of a less convenient cicatrix resulting, and consequently of the stump proving less useful in progression.

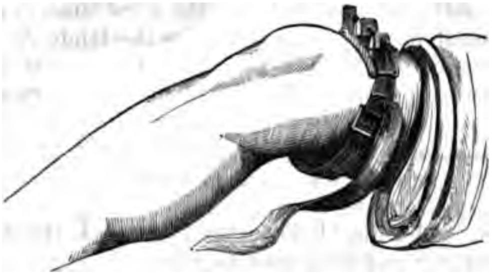
Amputation of the Leg.

This is not altogether superseded by the operation at the ankle. There are still not a few cases occurring, in which the latter procedure would prove quite insufficient. And in regard to some of these it is to be feared, that the natural preference for a new operation may lead to its performance in circumstances quite unsuitable. The affected parts of the leg-bones having not been sufficiently removed, sinuses and fistulæ may form, communicating with caries; long retarding complete cure; rendering the stump but little serviceable, perhaps, even when healed; and, probably, at length, demanding a second amputation.

Near the ankle, a fleshy stump is not to be obtained in thin persons; and in these, consequently, we may be compelled to cut somewhat higher than otherwise might have been necessary. On the other hand, there are stout limbs—their rotundity mainly caused by a solid œdema—in which it is desirable to amputate low down, in order to avoid redundancy of soft parts.

Hemorrhage is restrained by pressure on the popliteal, either by a tourniquet, or by the fingers of an assistant; or by the assistant's pressure on the femoral artery, as it passes over the brim of the pelvis. The patient is laid on a firm table, of convenient height, with the limbs projecting over its edge; the sound ankle is secured to the leg of the table by means of a towel—the work of an additional assistant being thus spared; and the doomed limb is supported by an assistant seated in front. The surgeon, feeling the exact outline of the bones, transfixes, passing his knife as closely as possible to their posterior surface; and,

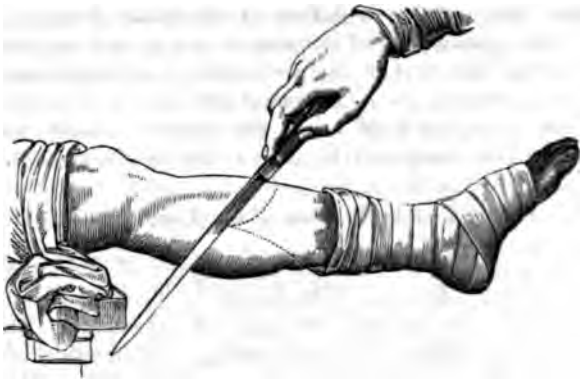
Fig. 357.



Malan's flat tourniquet, applied to the popliteal.

by carrying it downwards and outwards, a long posterior flap is fo
The knife is then laid on at the upper margin of the wound; by a

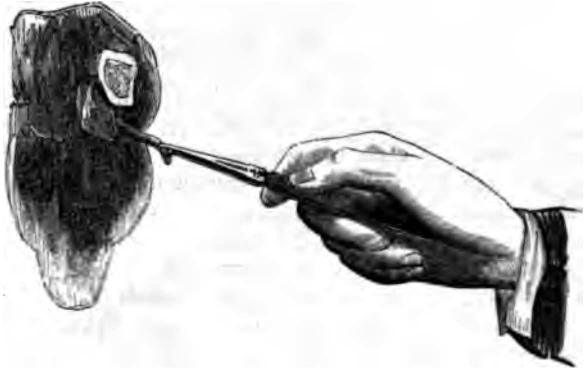
Fig. 358.



Amputation of the leg.

in front, in a semilunar direction, the integument is divided; this h
been retracted, the interosseous space is cleared by the knife passe
tween the bones, and the saw is then applied as close to the soft
as possible. If the ridge of the tibia project, much and sharply, it

Fig. 359.



The forceps shown at work. The artery fairly isolated, and made to project. Seldom it protrude but when it does, the ligature is applied close to the base, and scissors or knife amputates the re part.

be rounded off by means of the bone-pliers. Bleeding having
arrested, the flap is brought up and secured.

To facilitate transfixion, and guard against locking of the
between the bones, it may be well to make a little alteration in th
cedure. Supposing that the right leg is operated on, the knife is en
on the outside of the fibula, about an inch, or more, beneath the
where transfixion is contemplated; with a sawing motion the instru
is carried upwards along the outside of the bone, until the site of t
fixion is reached; the blade is then applied in front, to form the an

wound; and, the point having arrived at the inside of the tibia, transfixion is effected—the instrument emerging at the upper part of the wound formerly made on the outside of the fibula.

In operating immediately below the knee, the fibula is sawn across, along with the tibia. Disarticulation of the head of the former bone may improve the appearance of the stump, at the time of its formation; but experience has shown that the procedure is not warrantable, on account of the risk of subsequent inflammatory seizure in the knee-joint.

A short stump having been made, the patient usually rests on the knee, with the stump bent at right angles; and to the knee the artificial limb is adapted. When the stump is long, however, the motions of the knee-joint are retained, and the false limb is adapted to the leg immediately above the cicatrix.

When stout muscular men sustain such injury of the leg as requires amputation below the knee, a redundancy of flesh cannot fail to be obtained in the flap, by the ordinary mode of operation. And, accordingly, Mr. Liston has advised, in such cases, a modification of the circular amputation. "Supposing the left leg to be injured: with a common amputating knife an anterior semilunar incision is made through the skin, commencing from the inner side of the tibia, about four fingers' breadth below its superior extremity, and passing over its anterior aspect. A similar semilunar incision is made at the posterior part of the leg, its extremities joining the horns of the previous incision. The integument is then reflected upwards to a sufficient extent to cover the bones, and the operation is finished after the manner of the circular amputation."

Amputation of the Knee-Joint.

Latterly, this operation has also been revived; when injury or disease extend no higher than the condyles of the femur, and involve these only to a superficial extent. A semilunar incision is made on the front of the limb, passing beneath the patella; the integuments are dissected up, and transfixion is made behind; by cutting downwards, a very long flap is made from the back part of the leg; and, the soft parts having been all detached, section of the bone is made through the condyles. Bleeding having been arrested, the flaps are approximated. The operation is easily enough accomplished, but experience seems to have unequivocally decided on this revival unfavorably.

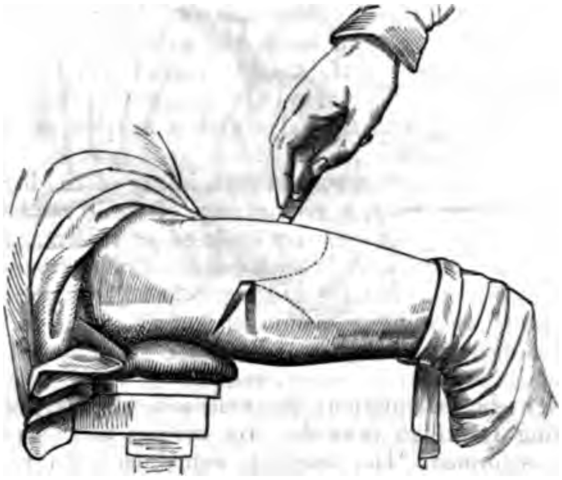
Amputation of the Thigh.

The patient is arranged as for amputation below the knee, but with the pelvis resting on the edge of the table. The femoral is compressed by an assistant, as it passes over the horizontal ramus of the pubes. The operation is by double flaps.

Low down in the thigh, a suitable amount and character of soft parts can be obtained only from the lateral aspects of the limb. Transfixion, accordingly, is made perpendicularly.

On the upper part of the thigh, the flaps are anterior and posterior; transfixion is horizontal; and the operation is performed in the same way as the analogous procedure in the arm. The posterior flap be considerably longer than that in front; to compensate for the displacement upwards, by contraction, to which the muscles on t terior part of the thigh are liable—and for the greater amount manent atrophy by absorption, which the posterior flap invarial

Fig. 360.



Amputation of the thigh.

dergoes. Immediately after section by the saw, the muscles i into the trochanter-minor project the end of the bone forwards; consequence of this, protrusion at the upper angle of the wound be apt to take place, were the flaps made laterally; while, as it more the bone is bent forwards, the more completely is its ext covered by the anterior flap.

Amputation of the Hip-Joint.

Amputation at the hip-joint is seldom required. The operation of great severity, and eminently perilous to life; yet, when stances are urgent and decided, we need not shrink from its p ance. There are already nearly thirty successful cases in the of surgery.[1] For malignant disease of the femur, the operatio advisable; experience having shown that, even although the op itself may be temporarily successful, return of disease in the i will surely carry off the patient—probably at an earlier perio more painfully than if the tumor had been left undisturbed in it nal site.

The patient is placed on the table, with his pelvis projecting fr edge. A steady assistant compresses the femoral; and is ready low the knife with his fingers, during formation of the anterior that he may grasp the end of the vessel almost as soon as it is d

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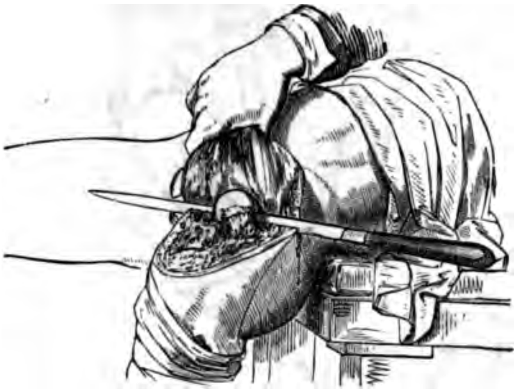
[1] Brit. and For. Rev. No. 43, p. 112.

The knife is entered about midway between the trochanter major and the anterior superior spinous process of the ilium, and is made to emerge on the inside of the thigh, after having passed in a somewhat curved direction over the articulation; the assistant, who supports the limb, gently rotating the thigh inwards. By cutting downwards, a suitable anterior flap is formed. The assistant, then abducting the thigh, presses it backwards; and by a determined sweep of the knife over the head of the bone thus made prominent, the joint is cut into. With the point of the instrument, the round ligament is divided, and disarticulation effected. The blade of the knife is then placed behind the bone, and carried downwards and backwards, so as to form the posterior flap; the assistant managing the limb so as to prevent locking of the instrument by the trochanter major. Or the posterior flap may be formed by cutting from without inwards. However made, it is instantly covered by a sponge; and the vessels there are rapidly secured. Afterwards, the assistant is relieved from his charge of the femoral.

Fig. 361.



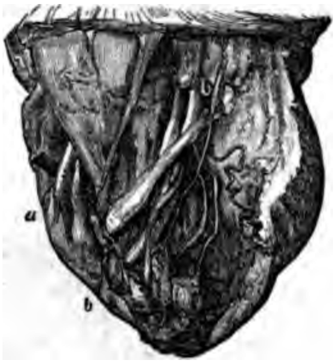
Amputation of the hip-joint.

By some, the formation of lateral flaps is preferred. Not unfrequently, in cases of injury, there may be no room for selection; the extent of the accidental wound precluding all attempts at regular operation, and compelling the surgeon to shape his flaps according to what may be, perhaps, quite an original mode of procedure.

Affections of Stumps.

Neuralgia of the stump is no unfrequent result of amputation, however skilfully conducted. It is most commonly observed after amputation below the knee. If no change of structure in the nerve can be detected, the treatment must be such as is suitable for neuralgia in general; and, of the remedies usually found most useful, iron internally, and the light application of nitrate of silver to the part may be specially mentioned. If neuromata plainly exist, entangled with the dense cicatrix, they ought to be removed; and, for this purpose, a repetition amputation on a minor scale is usually necessary; care being ta

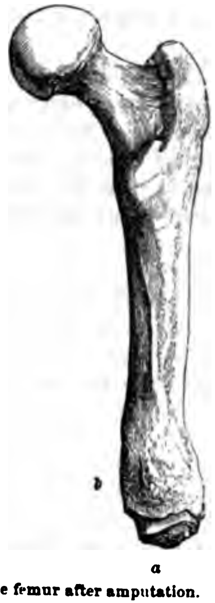
Fig. 362.



Neuromata of stump, after amputation of the arm. A large neuromatous mass at *a*: opposite tumors are more defined.

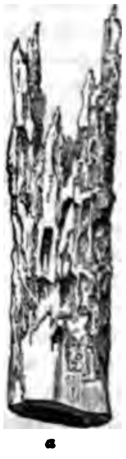
the fashioning of the stump, and in the after-treatment of it, th nerves be not again similarly circumstanced. Not unfrequently ever, notwithstanding every care, neuralgia returns—obviously dep

Fig. 363.



Necrosis of the femur after amputation. At *a*, the sequestrum in process of separation. At *b*, the parent bone enlarged, and undergoing inflammatory change, necessary for detachment and repair.

Fig. 364.



The sequestrum detached; at its lowe including the whole thickness of the b gradually shelving upwards, as such a usually do.

on a general more than on a local cause. The neuralgic part not be pressed upon, in the adaptation of any artificial limb.

Exfoliation from the stump seldom follows a well-conducted fla ration. It is most likely to occur, when section has been made in the dense part of a bone—as in the middle of the femur. The sequestrum may consist of a mere scale from the sawn surface; or it may be of some length—involving the whole thickness of the bone at its lower part, and tapering upwards, of a cancellous texture. Healing of the wound is necessarily delayed, until detachment and extrusion of the sequestrum have taken place.

Sometimes, in an ill-formed stump, or when the soft parts have perished by sloughing, the end of the bone projects uncovered, partially necrosed, and in part, perhaps, carious. In such a case, removal of the amputation is necessary; or the making of such incisions as may admit of the bone being sawn, at a point sufficiently high for subsequent fleshy covering.

The accidents of exfoliation, and protrusion of the end of the bone, ought to be prevented; by fashioning the flap, or flaps, so as to afford a full covering for the end of the bone—allowance being always made for subsequent contraction and atrophy; by sawing the bone, carefully, close to its connection with the soft parts—not leaving any portion bare and projecting, stripped of both flesh and periosteum, at the time of the operation; by so conducting the cure as to prevent untoward accessions of inflammation; whereby ulceration, sloughing, or long gaping of the wound might occur; by opposing excessive retraction of the muscles, if need be, by bandaging—in those cases in which the process of granulation is interrupted or tedious. The face of a well-formed stump is "fenced with firm skin, and no more liable to accident than a man's finger-ends."

A *Bursa* usually forms over the end of the bone; tending towards tolerance of pressure. A blow, or other injury, may induce painful enlargement of this; and the fluctuation, and other characters of the swelling, may simulate the condition of acute abscess very closely. Accuracy of diagnosis is obviously of importance; as, in the one case, early incision is advisable; while, in the other, rest and fomentation, with perhaps leeching, prove sufficient.

Hemorrhage.—Bleeding, taking place within a few hours after the operation—when the patient grows warm in bed, and recovers fully from the state of shock—usually requires an undoing of the partial approximation of the wound, and the application of ligatures to the open vessels. But if, at the time of operation, due care have been taken to apply deligation accurately to each likely orifice, the occurrence of such a casualty need seldom be apprehended.

Hemorrhage which occurs at a more remote period, in consequence of ulceration having attacked the stump, may, if slight, be restrained by pressure. But, in general, deligation of the arterial trunk is necessary; for example, deligation of the femoral, after amputation below the knee; deligation of the humeral, after amputation of the forearm.

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